

**TEMPERATURE MONITORING
ON THE
SCOTT RIVER**

**Water Year 97 Report
for
USFWS Agreement # 14-48-001-96557**

**Prepared By:
Lorrie Bundy
Project Coordinator**

For

**Siskiyou Resource Conservation District
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ABSTRACT

This project utilized Onset HoboTemp electronic units to monitor water temperatures at selected sites in the Scott River and selected tributaries of the Scott River Watershed. Data was collected at various sites beginning in May 1997 and continued through October 1997. Data was entered into the Klamath River Information System. Figures were then compiled from data sets for comparison of water temperatures at these various sites.

Baseline information was collected to add to the collective knowledge of the Scott River temperature regime. In the future, a comprehensive analysis of data collected by all cooperating groups (US Forest Service, large timberland owners, schools, Siskiyou RCD/Scott River CRMP) is expected to bring the collection efforts from baseline monitoring to trend monitoring of critical areas.

INTRODUCTION

Water temperatures in a stream course are the results of many influences. Bank and streambed content, soil type, and vegetation all affect the temperature of water flowing past a specific location. Other factors include climate, event runoff, and tributary inclusion. Changes brought about by natural and man-made activities may have a detrimental cumulative effect on stream conditions, including temperature. In an effort to identify where these temperature changes may be located on the Scott River, a consistent pattern of monitoring from year-to-year was started in Water Year '95 (October 1, 1994 to September 30, 1995). Comparisons of temperatures from station to station and year to year have identified areas of cool water intrusion and warm water reaches. This information has lead to specific restoration work in appropriate locations. Additionally, having a baseline reference of temperatures should indicate positive changes brought about by any restoration efforts. This project was designed to coordinate the collection of data on a regular basis at a reasonable cost in terms of dollars and time.

Water temperature is an integral part of determining the relative health of a watershed and its ability to provide adequate habitat for specific type of fisheries. A salmonid population needs cooler water to thrive and propagate. Optimum temperatures needed range from about 42° F for chinook salmon spawning in the fall and 50° F to 59° F for rearing juveniles. Lethal temperatures occur at about 78° F to 80° F (KRBFTF 1991 and USDAFS 1991).

OBJECTIVES

The objectives of this project have been as follows:

- A. Sample daily and seasonal water temperature conditions in mainstem Scott River and selected main tributaries.
- B. Isolate changes in mainstem water temperatures by stream reach.
- C. Determine if stream flows from selected tributaries significantly affect water temperatures in the Scott River.
- D. Correlate daily temperatures with daily stream flows, precipitation and snowpack data, and official climatic data.

The Scott River Watershed Coordinated Resource Management Planning Council (CRMP) supports this water quality monitoring effort in the *Scott River Fall Flows Action Plan* (1995). In addition, the Long Range Plan For The Klamath River Basin Conservation Area Fishery Restoration Program prepared by the Klamath River Basin Fisheries Task Force (1991) states that "The Task Force should encourage efforts to gather temperature ... information". In fact, the Task Force recommended this project for funding by the U. S. Fish and Wildlife Service.

MATERIALS AND METHODS

A. Equipment

Previous funding from the USFWS and the Siskiyou County Fish and Game Commission provided for 23 HoboTemp units (HT) made by Onset Computer Corporation. These units were selected as an affordable and reliable temperature data logger. Six units have been removed from use over a three-year period due to vandalism, theft, or physical damage. An average of two units is lost each monitoring season.

These units consist of a thermistor, related microelectronics, and a battery enclosed in a 1³/₄" x 1¹/₄" x 1¹/₂" case. This unit is enclosed in a 2" diameter, waterproof PVC case. For this project, the case was then secured in a 7" long, 3" diameter steel pipe. The case was chained to a structure (usually a tree) to prevent transport during high water. Water appeared to flow freely through the case and did not appear to affect the data collected. The HoboTemp units have a maximum memory capacity of 120 days when set to record at 1.6-hour intervals. The stored information can be downloaded to a personal computer through a 9-pin connector. Software to download data and start the recording was also purchase through Onset. An Inex 4150 Notebook Computer

was purchased in 1995 for downloading data in the field. This computer facilitated data collection and saved time by allowing the HoboTemps to be launched and downloaded in the field and did not have to be removed and brought in to a central location for downloading/launching.

B. Calibration

Each HoboTemp (HT) was calibrated at 0° C (32° F) and then at room temperature. First the HTs were calibrated during the annual effort of the Ad Hoc Water Monitoring Committee of the Scott River Watershed Coordinated Resource Management Planning Council (CRMP). The HTs were set to record at five-minute intervals in order to establish as many readings within a two-hour frame as possible. The calibration was accomplished by adding equal parts of water and ice to a 30-gallon cooler with a lid. The HT was then placed in the waterproof PVC case. A series of cases were then threaded onto a piece of rebar or steel using the steel ring on the PVC case. The cases threaded onto steel were then immersed in the ice/water bath. An ASTM thermometer was then carefully added to the ice/water bath, ensuring that the mercury-filled bulb was immersed at the same level as the HTs and that the measuring scale of the thermometer was easily visible. The lid of the cooler was then closed. Participants recorded the ASTM thermometer readings at ten-minute intervals. Ice was added as needed.

Next, the HTs were then calibrated at room temperature, 19° C (66° F). Under the Project Quality Assurance Project Plan by California Department of Fish and Game (1995), two water baths, one at 5° C and one at 20° C are necessary for calibration. Since no laboratory is locally available for completing this type of calibration, and data is used for comparison purposes only, this level of precision was not employed. However, an attempt was made to confirm the results of the ice/water bath calibration. The HTs were placed in a cardboard box, 6"H x 10"L x 6"W, with no lid. An ASTM thermometer was then taped to the top of the cardboard box with the mercury-filled bulb located in the center of the box, just above the HTs. The thermometer was not horizontal; the mercury-filled bulb was below the top of thermometer. The cardboard box was placed inside a room with normal air circulation (i.e. no fans, no traffic, and no open windows).

Both calibration results confirmed that all but one HT met the $\pm 0.5^{\circ}$ C tolerance as indicated in Techniques of Water-Resources Investigations of the USGS, Book 1 (1978). The non-functioning HT was returned to Onset for factory calibration. It was then calibrated with three other HT to ensure accuracy.

C. Site Selection

Sampling sites were recommended by the Ad Hoc Water Monitoring Committee of the CRMP at a meeting in April 1997. Committee members included USDA Forest Service, Siskiyou RCD,

Siskiyou County Schools, Timber Products, and Fruit Growers, Inc. Each site was evaluated for its access and physical characteristics. As most of the locations are on private land, permission for access was required for most all the proposed sites. Previous landowner participants were willing to allow another year of monitoring to occur on their property. Their consistent participation has been encouraging. Appendix A, *Map of 1997 Locations*, contains a map of the 1997 monitoring locations.

D. Data Collection

HTs were placed at each location between March 13 and March 15. Temperature data was recorded every 1.6 hours and downloaded at periodic intervals. All sites were monitored on a regular basis to insure that the HTs were still in place. When data sets were downloaded, air and water temperatures were collected using hand-held thermometers. On a few occasions, the HT was moved to insure that it would remain in the main flow of water at the site. Data determined to be extraneous (out of water, pre/post placement in water, etc.) was not included in the data analysis. Appendix B, *Station Operation Duration*, contains a table summarizing when data was collected from each location. Missing time periods indicate a lost or damaged unit.

Weather data consisting of precipitation, and air temperature was retrieved electronically from the California Data Exchange Center (CDEC) maintained by the California Department of Water Resources, Division of Flood Management. Appendix C, *Climate Station Information*, contains a table summarizing the location and type of stations available. Only two stations were used for comparison in this report as presented in the results section.

E. Data Processing

Data were downloaded using Boxcar or Data Logger software purchased from Onset Computer Corporation. This data is in raw form and must be transferred to another program editing and analysis. Both Microsoft Excel v5.0 spreadsheet software and the Klamath River Information System (KRIS, a geographic information system) were used for editing and analyzing data. Data from CDEC was downloaded in Standard Hydrological Exchange Format (SHEF) and imported as text into the spreadsheet program.

RESULTS

Water Year 97 (October 1, 1996 - September 30, 1997) was an above normal water year with 708,690 acre-ft of water passing the USGS gage near Fort Jones. The 56-year average is 345,671 acre-ft of water. There were brief short periods of time with no water flowing in the upper reaches of Scott Valley (upstream of Fay Lane). Stream temperatures ranged from a low of near 46° F in French Creek to highs in the 80° F to 81° F just upstream of French Creek. The data

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were divided into calendar months and the monthly statistics are listed by site location in Appendix D, *Monthly Statistics by Site Location*.

All of the selected sites were systematically sampled during late spring and summer flows through the end of the water year (Objective A). Differences in temperatures from site to site are presented in graphic form and can be numerically evaluated by comparing the data sets for each site (Objective B). An evaluation of tributary and mainstem temperatures show that French Creek significantly affects the water temperatures in the Scott River, lowering the mainstem temperatures as much as 2 °F in August (Objective C). There is a USGS stream flow gaging station on the Scott River near Fort Jones. However, corrected stream flow information was not available at the time of writing this report. Preliminary numbers were available from USGS but corrected numbers were not. A correlation between average daily streamflow and average daily temperature will be included in the Temperature Monitoring Report for Water Year 1998.

Precipitation and daily temperatures are compared by use of an overlay in Appendix E (Objective D). This overlay is formatted to fit over the figures in Appendix E. The precipitation data are taken from the Callahan Station and the air temperature data are taken from the Quartz Hill station. Station information is presented in Appendix C, *Climate Station Information*. The figures in Appendix E are weekly moving averages with an interval of 15 (15 readings taken in one day). The Maximum Weekly Average Temperature (MWAT) shown in the figures, -63 °F, is intended for late summer rearing of juvenile coho (NMFS 1997).

Comparison of daily averages are presented in graphical form in Appendix F, *KRIS Treatments*. Finally, a comparison of monthly max, ave, min temperature over distance is presented in Appendix G, *Monthly Temperatures by River Mile*. These figures show the warm and cool reaches of the river. This should provide quick reference for initial examination of temperature conditions at each location. If additional analytical comparisons are desired, please contact the Siskiyou RCD Office.

DISCUSSION

Water temperatures collected in a systematic fashion can provide useful information about the condition of a watershed. The Scott River drainage is subject to many use and management activities, both private and public. This project has been a successful attempt to provide temperature data from locations that can be utilized year after year provided there is landowner willingness. Data sets are included in KRIS and are available in electronic form from the USFWS Office in Yreka.

Collection of water temperatures through the Scott Valley (RM 50.9 to RM 36.8) has only been done on a random basis prior to 1995. This project has been the model of a consistent, year to

year temperature data collection system at a reasonable cost in man-hours and financial resources. For example, the river reach containing RM 36.8 has shown high stream temperatures since monitoring began in 1995. Because of this, planting and cool water release projects have been proposed for this reach of the river for 1997 funding.

Some of the difficulties encountered this third year of monitoring include:

- 1) loss, theft, or damage of some HT units;
- 2) receding water levels stranded some HTs; and,
- 3) functionality of KRIS in providing figures for analysis.

These are the same difficulties that existed the first and second year of temperature monitoring.

Some loss is to be expected with field data collection. In fact, three units were lost this year. All three units were adjacent to each other. Vandalism is suspected since parts of the HTs were recovered near two of the three sites. While landowners are not likely to damage units they have agreed to place on their property, visitors to the landowner's property may not know what the unit is or what it does. Laminated tags placed inside the steel case explaining the program, and providing contact information may reduce vandalism.

New personnel conducted this third year of monitoring (1997) and will continue with the fourth year (1998). Familiarity with the Scott River low flow behavior should prevent stranded HTs in the future.

Solutions to the functionality of KRIS are being developed with the RCD and KRIS developer, Jan Derksen. Most of the difficulties are with the limitations of the graphing capability, and the options for data analysis. Only fixed week intervals can be printed in KRIS (i.e. Week 1 can only mean January 1 - January 7). Currently, moving averages can not be computed in KRIS. In addition, the mechanism for installing new versions of KRIS and not losing locally updated information is not well understood.

In summary, the information collected by the Scott River Temperature Monitoring Program has helped direct project locations and provided baseline information. In the future, a comprehensive analysis of data collection efforts from all cooperating entities is expected. The Program can then focus on trend monitoring of critical locations.

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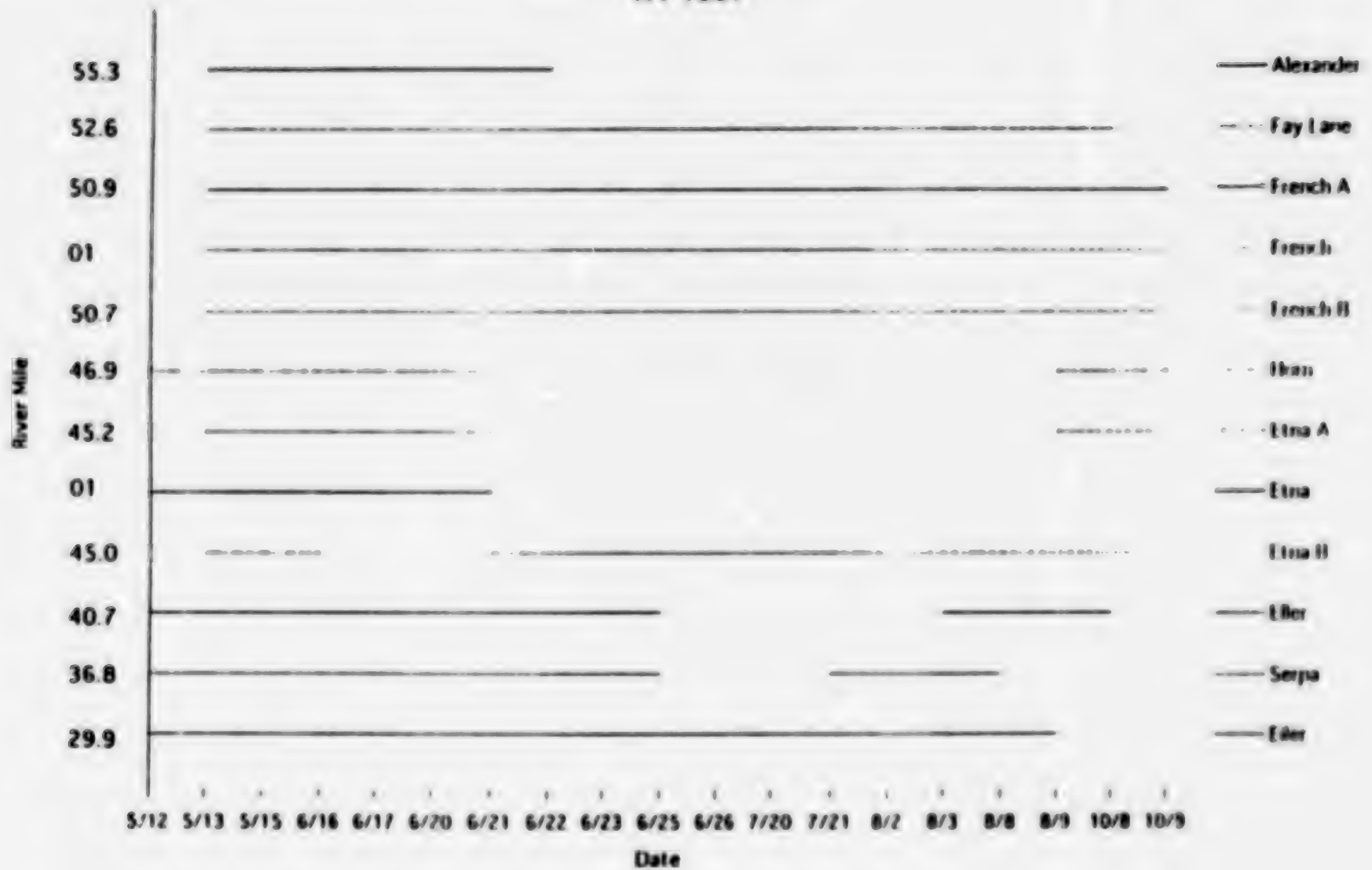
APPENDIX A – Map of 1997 Monitoring Locations

Scott River Watershed
Siskiyou RCD 1997
Temperature Monitoring Sites



APPENDIX B - Station Operation Duration

Station Operation Duration WY 1997

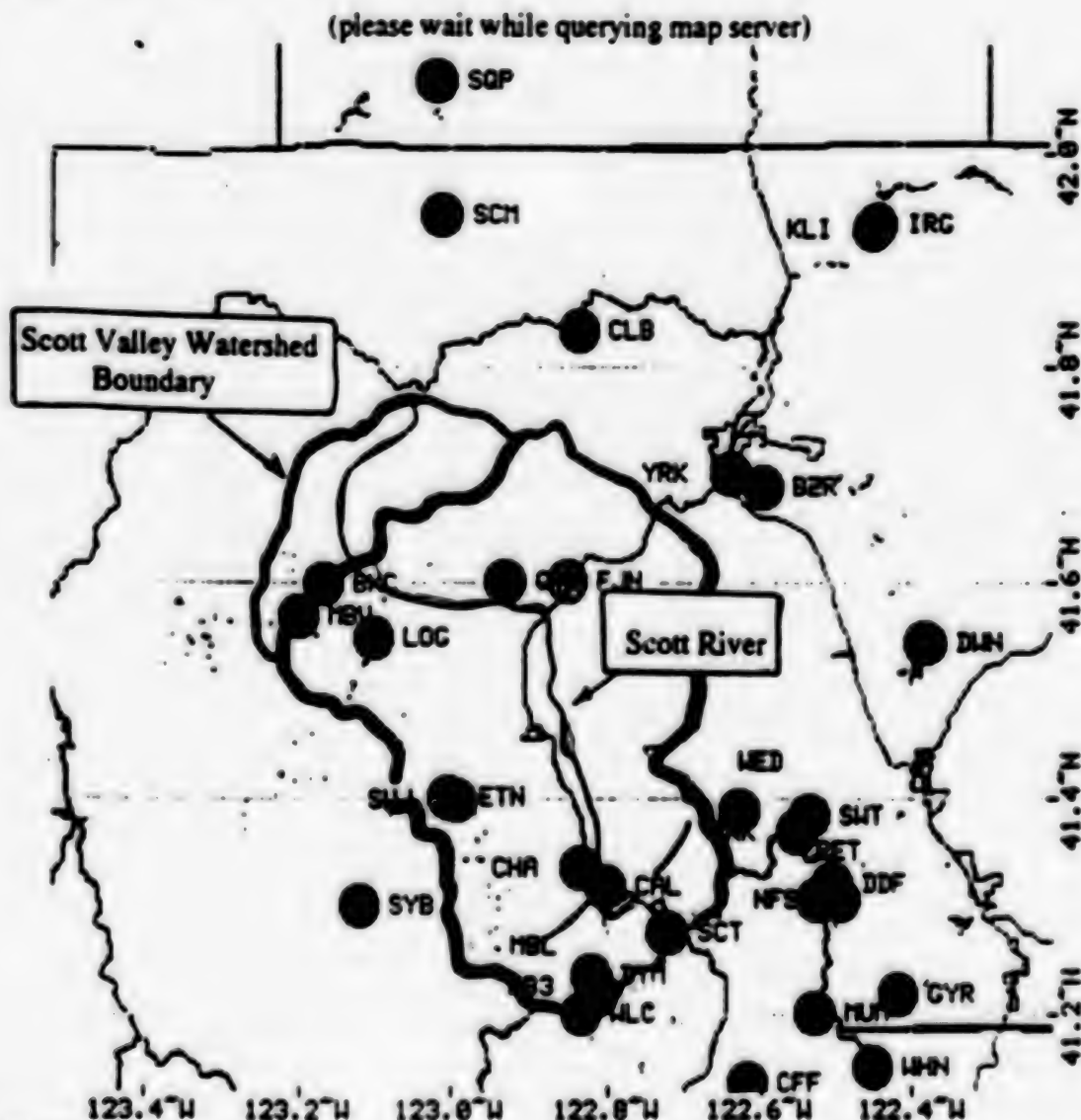


APPENDIX C - Climate Station Information

Temperature Monitoring on the Scott River 1997

C

Stations around FORT JONES RS



[Zoom in](#) [Zoom out](#)

Only stations within 30 minutes of latitude or longitude of the center of the map are shown.

Map generated by the [US Census Bureau](#) map service. Check out their [Map Browser](#) interface. Stations near here: 7UP ASH BBS BDY BFL BGB BNK BWR BXC BZR CAL CCE CFF CFR CHA CLB CLE CLR COP CZP DDF DDW DGC DLT DNM DWN DYM ELK ETN FJN FWN GBS GRD GYR HAP HDL HIG HLC HOO HPA HRZ HZS IRC IRG JTL KES KLI KLR KWK LEW LFH LKS LOG LSH LWS MB3 MBL MBV MCL MCO MLD MSC MSH MSS MUD MUM NFS OKK OLS PET PMN PRS PRK PTS PTG QTZ RRM SCM SCT SDF SHA SHD SHK SHM SHO SHS SLT SPP SQP SRB SSB STM SWJ SWT SYB TGS TRC TYR WED WHN WHT WLC WPC WVR YRK

Station ID or part of a name:

[Get Map Around Station](#)

Climate Station Information for Scott Valley, CA

Name	Station ID	Elev (ft)	Operat	Lat	Long	Type	units	Incr	sens
Callahan	CHA	3136	USFS	40.3330N	122.8330W	accum precip	Inches	h	2
						air temp	deg f	h	4
						rel hum	%	h	12
						wind sp	mph	h	9
						wind direc	deg	h	10
Callahan	CAL	3185		41.3167N	122.8000W	accum precip	Inches	m	2
Quartz Hill	QTZ	4238	CDF	41.6000N	122.9290W	accum precip	Inches	h	2
						air temp	deg f	h	4
						rel hum	%	h	12
						wind sp	mph	h	9
						wind direc	deg	h	10
Fort Jones RS	FJN	2725	USFS	41.6000N	122.8500W	accum precip	Inches	m	2
Scott Mountain	SCT	5900	DWR	41.2750N	122.7200W	accum precip	Inches	h	2
						air temp	deg f	h	4
						snow wc	Inches	h, d	3
						snow wc adj	Inches	d	82
Middle Boulder	MB3	6200	USFS	41.2250N	122.8110W	air temp	deg f	h	4
						snow wc	Inches	h, d	3
						snow wc adj	Inches	d, m	82
Dynamite Meadow	DYM	5700	USFS	41.2330N	122.8170W	snow wc	Inches	m	3
						snow wc adj	Inches	m	82
Box Camp	BXC	6450	USFS	41.5970N	123.1650W	snow wc	Inches	m	3
						snow wc adj	Inches	m	82
Marble Valley	MBV	5900		41.5670N	123.1980W	snow wc	Inches	m	3
						snow wc adj	Inches	m	82
Middle Boulder 1	MBL	6600	USFS	41.2170N	122.8070W	snow wc	Inches	m	3
						snow wc adj	Inches	m	82
Swampy John	SWJ	5500	USFS	41.3970N	122.9930W	snow wc	Inches	m	3
						snow wc adj	Inches	m	82
Etna Mountain	ETN	5900	USFS	41.4000N	123.0000W	snow wc	Inches	m	3
						snow wc adj	Inches	m	82
Log Lake	LOG	5300		41.5470N	123.1000W	snow wc	Inches	m	3
						snow wc adj	Inches	m	82

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APPENDIX D - Monthly Statistics by Site Location

Alexander RM 55.3	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	55.70	59.84				
Median	54.81	58.73				
Mode	51.74	55.93				
Standard Deviation	4.17	6.08				
Sample Variance	17.37	37.01				
Kurtosis	-0.78	-0.23				
Skewness	0.44	0.70				
Range	18.70	26.11				
Minimum	48.39	50.63				
Maximum	67.09	76.74				
Count	274	325				
Confidence Level(95.0%)	0.49	0.66				

Fay Lane RM 52.6	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	55.04	59.01	64.87	66.32	63.16	58.92
Median	54.58	57.79	63.99	64.58	62.25	57.79
Mode	52.48	55.11	62.25	63.41	61.68	57.25
Standard Deviation	3.78	4.57	5.22	4.14	4.27	3.08
Sample Variance	14.27	20.88	27.24	17.12	18.20	9.48
Kurtosis	-0.84	-0.73	-0.84	-1.03	-0.53	0.38
Skewness	0.40	0.45	0.31	0.59	0.58	1.15
Range	16.77	20.93	22.30	14.79	17.82	13.10
Minimum	48.41	50.43	55.11	60.55	56.17	55.11
Maximum	65.18	71.36	77.41	75.34	73.99	68.21
Count	275	451	465	465	450	116
Confidence Level(95.0%)	0.45	0.42	0.47	0.38	0.39	0.56

French Creek Above RM 50.9	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	56.66	61.20	66.69	67.88	63.93	58.25
Median	56.22	60.02	65.83	67.04	63.45	57.26
Mode	54.09	56.76	62.27	63.45	61.16	56.22
Standard Deviation	4.22	5.43	5.83	5.21	4.88	3.93
Sample Variance	17.82	29.51	33.97	27.13	23.80	15.48
Kurtosis	-0.64	-0.84	-0.85	-1.16	-0.68	-0.29
Skewness	0.47	0.43	0.34	0.32	0.35	0.65
Range	20.08	21.93	24.64	19.44	21.50	17.29
Minimum	49.46	51.48	55.66	59.48	54.62	50.97
Maximum	69.54	73.41	80.30	78.92	76.12	68.26
Count	277	451	465	465	450	128
Confidence Level(95.0%)	0.50	0.50	0.53	0.47	0.45	0.68

French Creek	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	53.42	57.28	64.61	67.76	63.42	58.22
Median	52.78	56.69	64.38	66.70	62.94	58.09
Mode	50.28	55.30	63.80	64.38	62.36	58.09
Standard Deviation	3.44	4.35	4.64	3.70	3.74	3.56
Sample Variance	11.82	18.91	21.51	13.70	14.00	12.70
Kurtosis	-0.26	-0.55	-0.30	-0.83	-0.55	0.74
Skewness	0.45	0.42	0.14	0.53	0.49	-0.13
Range	18.02	18.97	23.55	16.05	15.37	16.95
Minimum	46.65	48.60	53.06	61.50	57.25	48.88
Maximum	64.67	67.57	76.61	77.55	72.62	65.83
Count	277	449	465	465	450	128
Confidence Level(95.0%)	0.40	0.40	0.42	0.34	0.35	0.62

French Creek Below RM 50.7	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	56.51	60.36	64.65	65.06	62.05	58.06
Median	55.86	59.50	64.09	63.22	61.79	57.25
Mode	53.90	56.42	61.50	60.36	60.36	56.97
Standard Deviation	4.09	4.91	4.43	5.06	2.90	3.38
Sample Variance	16.73	24.10	19.63	25.65	8.38	11.45
Kurtosis	-0.72	-0.83	-1.00	0.27	-0.66	-0.11
Skewness	0.43	0.41	0.15	1.15	0.15	0.45
Range	19.28	20.32	18.50	19.94	13.43	15.57
Minimum	49.16	51.40	55.02	59.50	55.30	50.84
Maximum	68.44	71.72	73.52	79.44	68.73	66.41
Count	276	450	465	465	450	127
Confidence Level(95.0%)	0.48	0.45	0.40	0.46	0.27	0.59

Horn Lane RM 46.9	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	56.22	59.50		64.81	61.08	57.01
Median	55.64	58.88		64.81	60.44	56.49
Mode	52.48	63.41		63.59	58.73	55.37
Standard Deviation	4.11	4.79		3.86	3.50	3.04
Sample Variance	16.90	22.92		14.90	12.25	9.25
Kurtosis	-0.82	-0.84		-0.90	-0.72	-0.48
Skewness	0.38	0.36		0.36	0.31	0.27
Range	18.07	19.78		15.45	14.60	13.24
Minimum	48.91	50.94		57.88	54.53	50.35
Maximum	66.98	70.72		73.33	69.13	63.59
Count	293	310		336	450	127
Confidence Level(95.0%)	0.47	0.53		0.41	0.32	0.53

Etna Creek Above RM 45.2	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	56.57	59.64		67.06	62.47	56.94
Median	56.17	58.88		66.41	62.07	55.86
Mode	51.96	57.79		61.50	58.37	55.30
Standard Deviation	3.92	4.44		5.04	4.70	3.70
Sample Variance	15.35	19.68		25.43	22.11	13.70
Kurtosis	-0.82	-0.84		-1.08	-0.62	-0.67
Skewness	0.37	0.35		0.30	0.31	0.40
Range	17.06	18.12		19.18	20.49	15.54
Minimum	49.92	51.96		58.37	53.34	50.00
Maximum	66.98	70.08		77.55	73.83	65.54
Count	278	310		336	450	127
Confidence Level(95.0%)	0.46	0.49		0.54	0.43	0.64

Etna Creek	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	55.96	59.45				
Median	55.11	58.33				
Mode	50.94	55.11				
Standard Deviation	4.22	4.17				
Sample Variance	17.81	17.38				
Kurtosis	-0.73	-1.07				
Skewness	0.51	0.46				
Range	17.46	15.73				
Minimum	48.91	52.48				
Maximum	66.37	68.21				
Count	293	310				
Confidence Level(95.0%)	0.48	0.46				

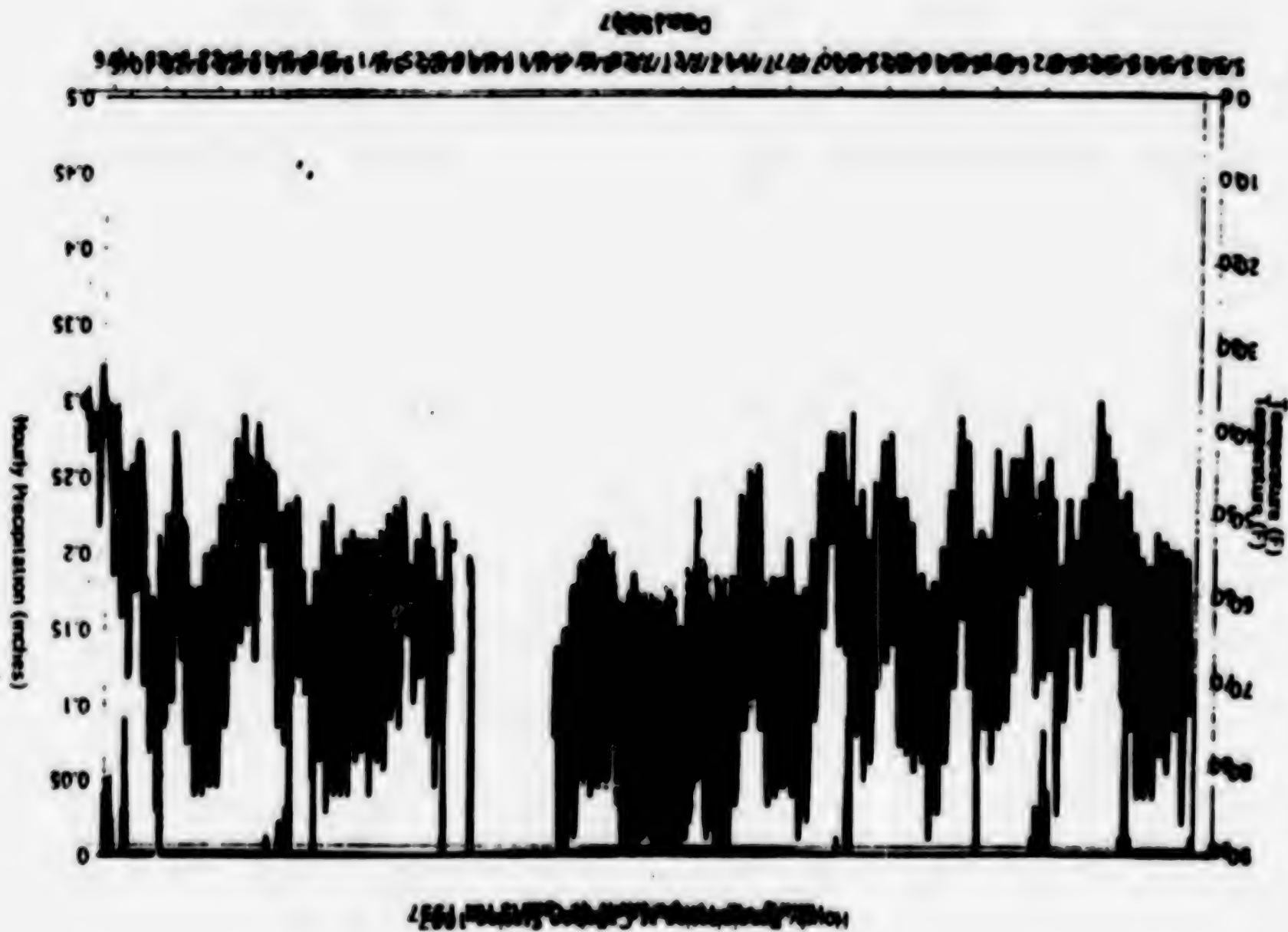
Etna Creek Below RM 45.0	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	56.80	60.13	65.31	66.80	61.60	55.94
Median	56.22	59.48	64.66	65.83	61.16	55.12
Mode	52.51	55.66	60.60	63.45	59.48	54.09
Standard Deviation	4.18	4.70	5.34	4.78	4.40	3.46
Sample Variance	17.49	22.08	28.56	22.81	19.36	11.95
Kurtosis	-0.75	-0.90	-1.06	-0.95	-0.50	-0.61
Skewness	0.41	0.37	0.17	0.33	0.33	0.38
Range	18.80	19.40	21.50	19.64	19.69	14.59
Minimum	49.46	52.01	54.62	57.82	53.02	49.46
Maximum	68.26	71.41	76.12	77.46	72.71	64.05
Count	278	371	465	465	450	127
Confidence Level(95.0%)	0.49	0.48	0.49	0.43	0.41	0.60

Eller Lane RM 40.7	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	58.31	62.17		70.15	63.85	57.62
Median	57.79	61.68		68.83	62.83	57.25
Mode	53.52	59.43		66.37	61.68	56.71
Standard Deviation	4.01	5.16		5.18	4.48	2.47
Sample Variance	16.08	26.67		26.78	20.04	6.09
Kurtosis	-0.95	-0.93		-0.83	1.16	-0.19
Skewness	0.26	0.27		0.54	1.17	0.03
Range	16.14	20.32		21.00	21.95	11.96
Minimum	51.45	53.00		62.25	56.17	51.45
Maximum	67.59	73.32		83.25	78.12	63.41
Count	309	360		425	450	117
Confidence Level(95.0%)	0.45	0.53		0.49	0.41	0.45

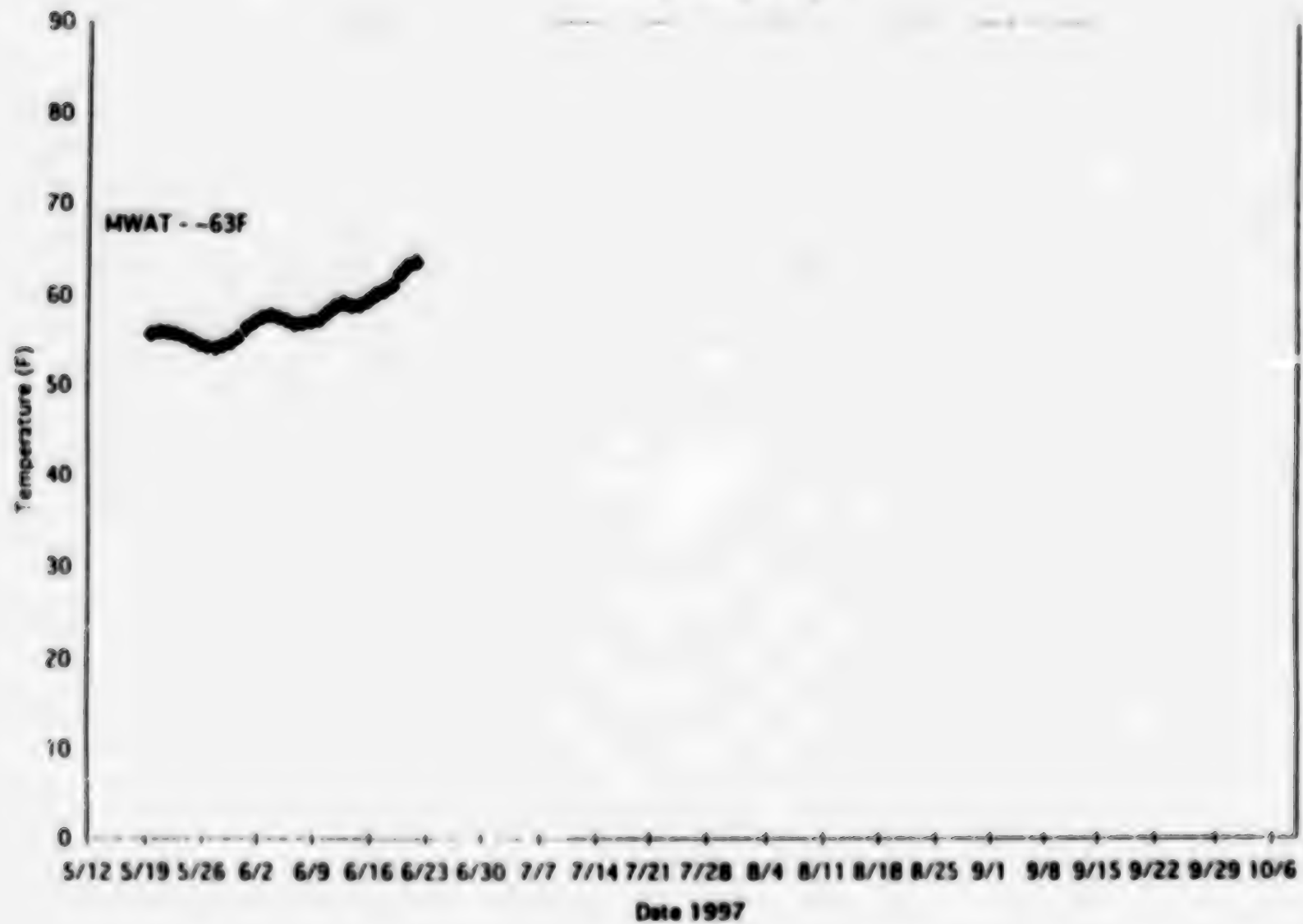
Sirpa Lane RM 36.8	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	59.39	63.28	68.91	71.33	63.85	56.92
Median	58.94	63.22	68.73	69.92	62.65	55.86
Mode	56.97	66.41	68.73	66.12	61.79	53.34
Standard Deviation	4.19	4.52	4.75	6.81	6.36	4.13
Sample Variance	17.55	20.47	22.57	46.37	40.39	17.02
Kurtosis	-0.96	-0.71	-0.44	-1.02	0.16	-0.81
Skewness	0.24	0.10	0.01	0.42	0.66	0.49
Range	18.22	20.54	22.93	25.36	29.44	16.70
Minimum	51.40	53.90	58.09	60.93	52.22	50.00
Maximum	69.62	74.44	81.02	86.29	81.66	66.70
Count	253	450	300	425	450	116
Confidence Level(95.0%)	0.52	0.42	0.54	0.65	0.59	0.75

Eller RM 29.9	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97
Mean	59.94	63.42	68.72	65.59	60.16	55.60
Median	59.48	62.89	68.26	65.23	60.02	55.12
Mode	59.48	65.23	63.45	65.23	62.27	54.09
Standard Deviation	3.84	4.46	5.65	4.63	3.34	2.56
Sample Variance	14.77	19.93	31.97	21.43	11.17	6.57
Kurtosis	-0.81	-0.76	-0.97	-0.55	-0.61	-0.96
Skewness	0.24	0.24	0.11	0.45	0.01	0.15
Range	18.76	19.40	22.87	20.36	15.12	10.14
Minimum	52.01	54.62	56.76	57.82	52.51	50.46
Maximum	70.77	74.02	79.63	78.18	67.63	60.60
Count	250	449	465	464	450	117
Confidence Level(95.0%)	0.48	0.41	0.51	0.42	0.31	0.46

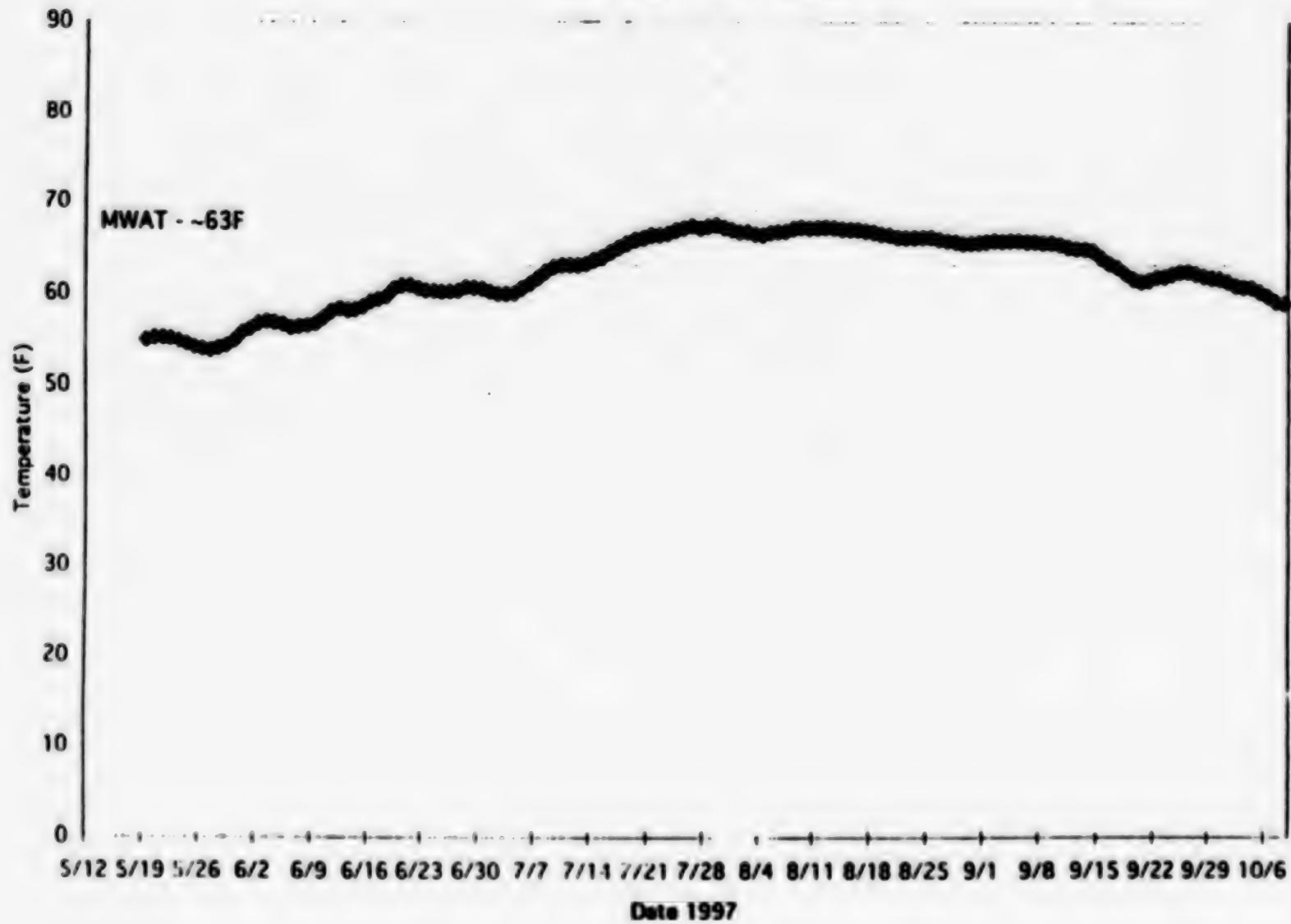
APPENDIX E - Precipitation and Air Temperature Overlay



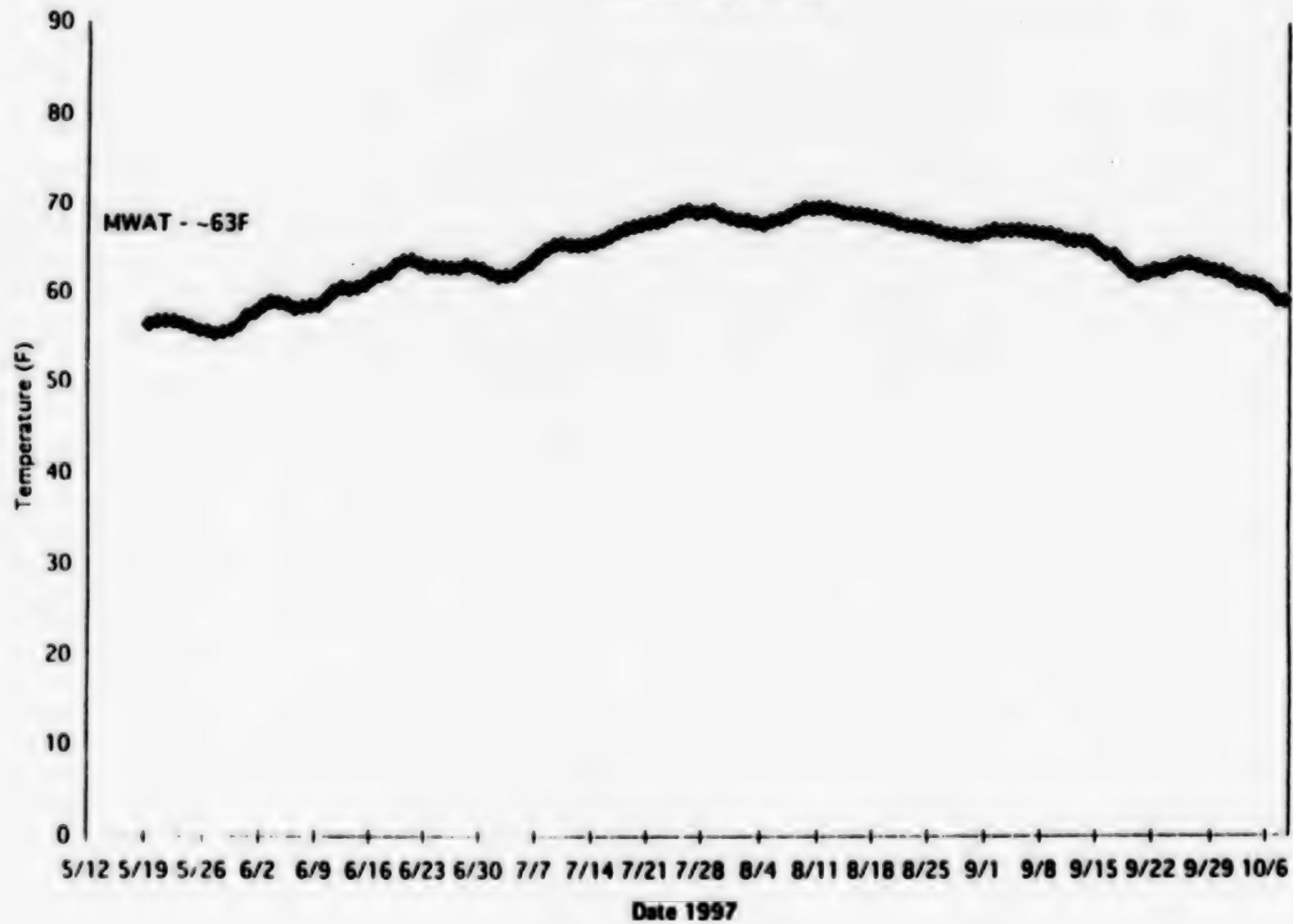
Alexander
Weekly Moving Average



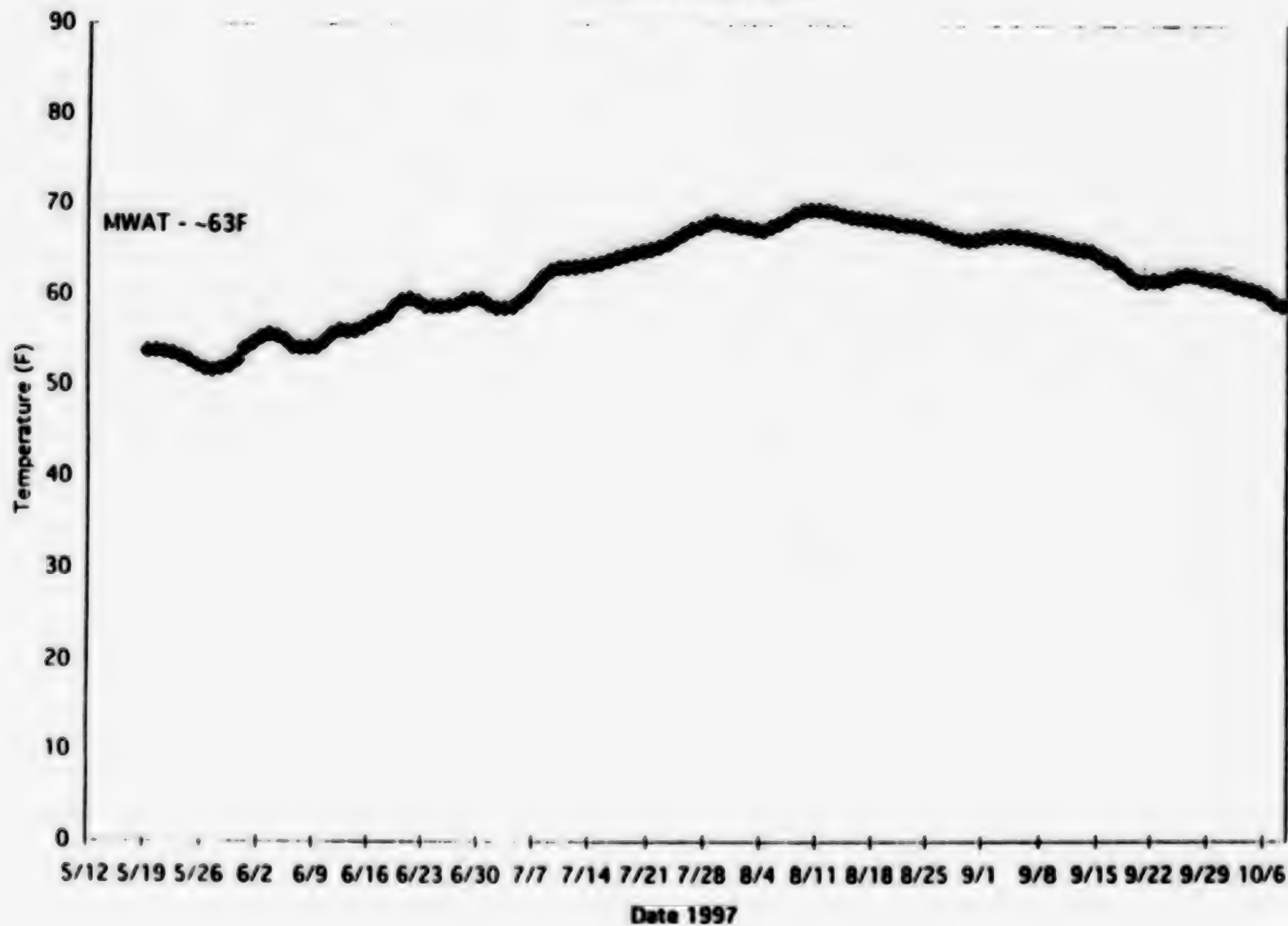
Fay Lane
Weekly Moving Average



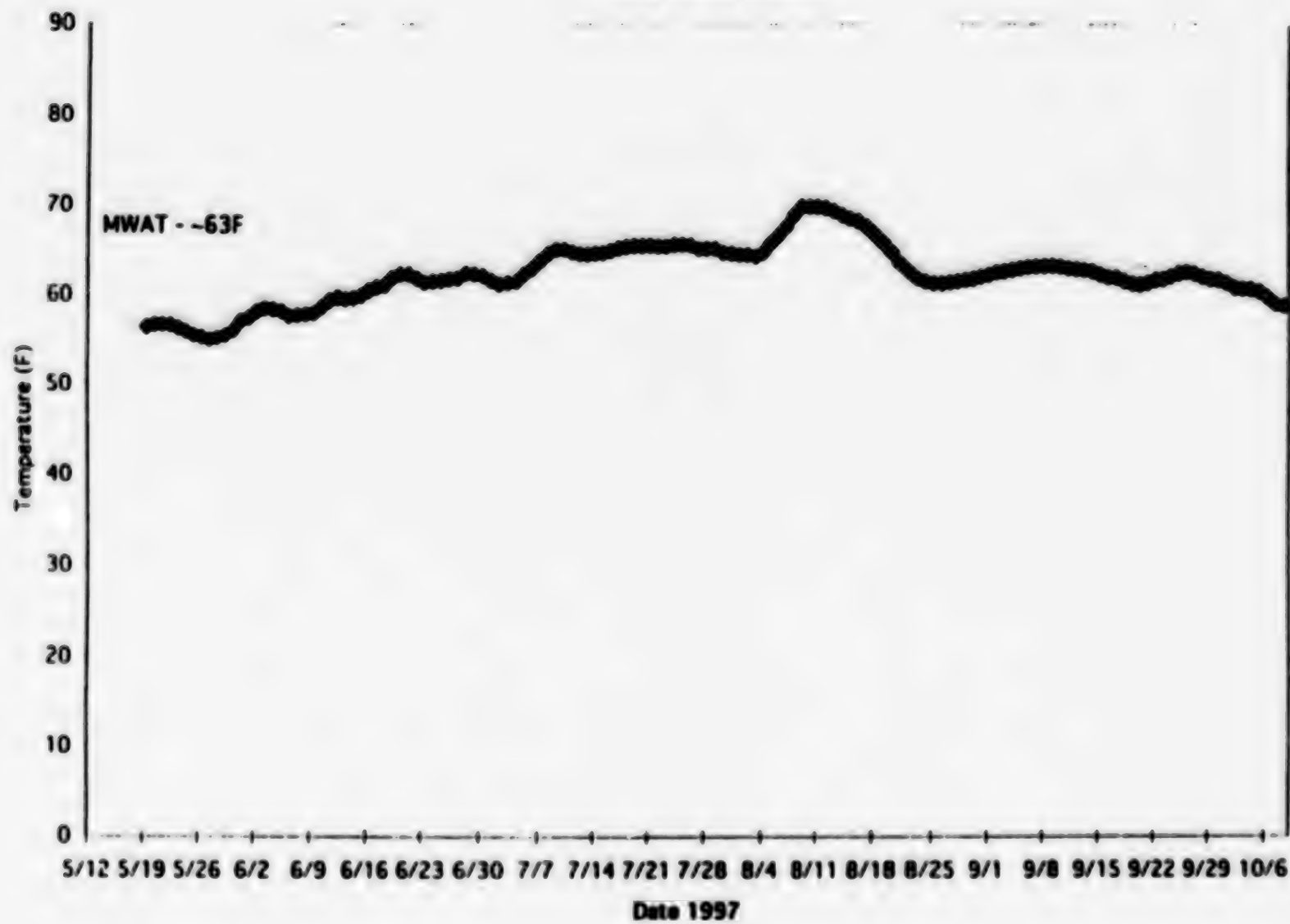
French Above
Weekly Moving Average



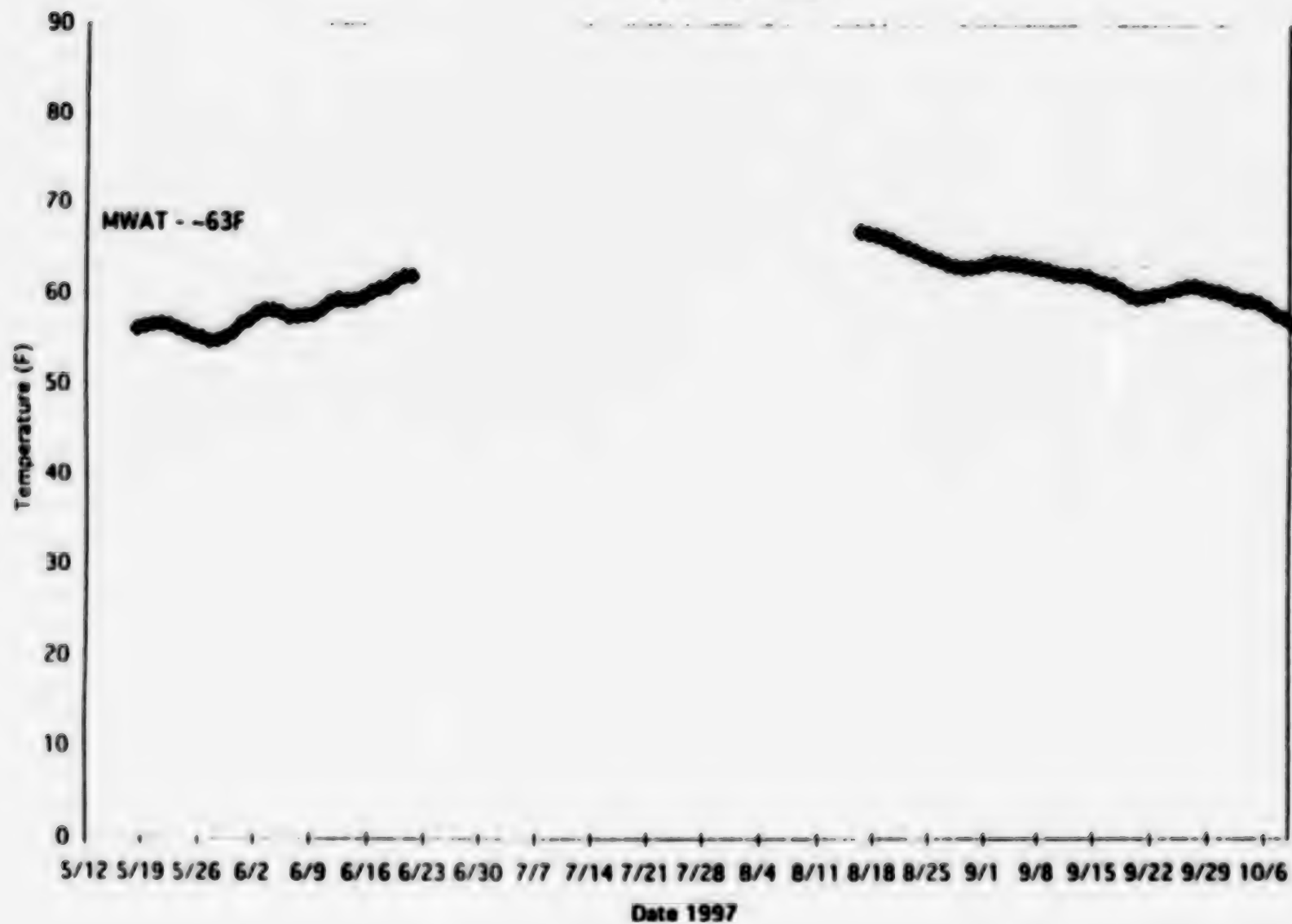
French Creek
Weekly Moving Average



French Below
Weekly Moving Average



Horn Lane
Weekly Moving Average

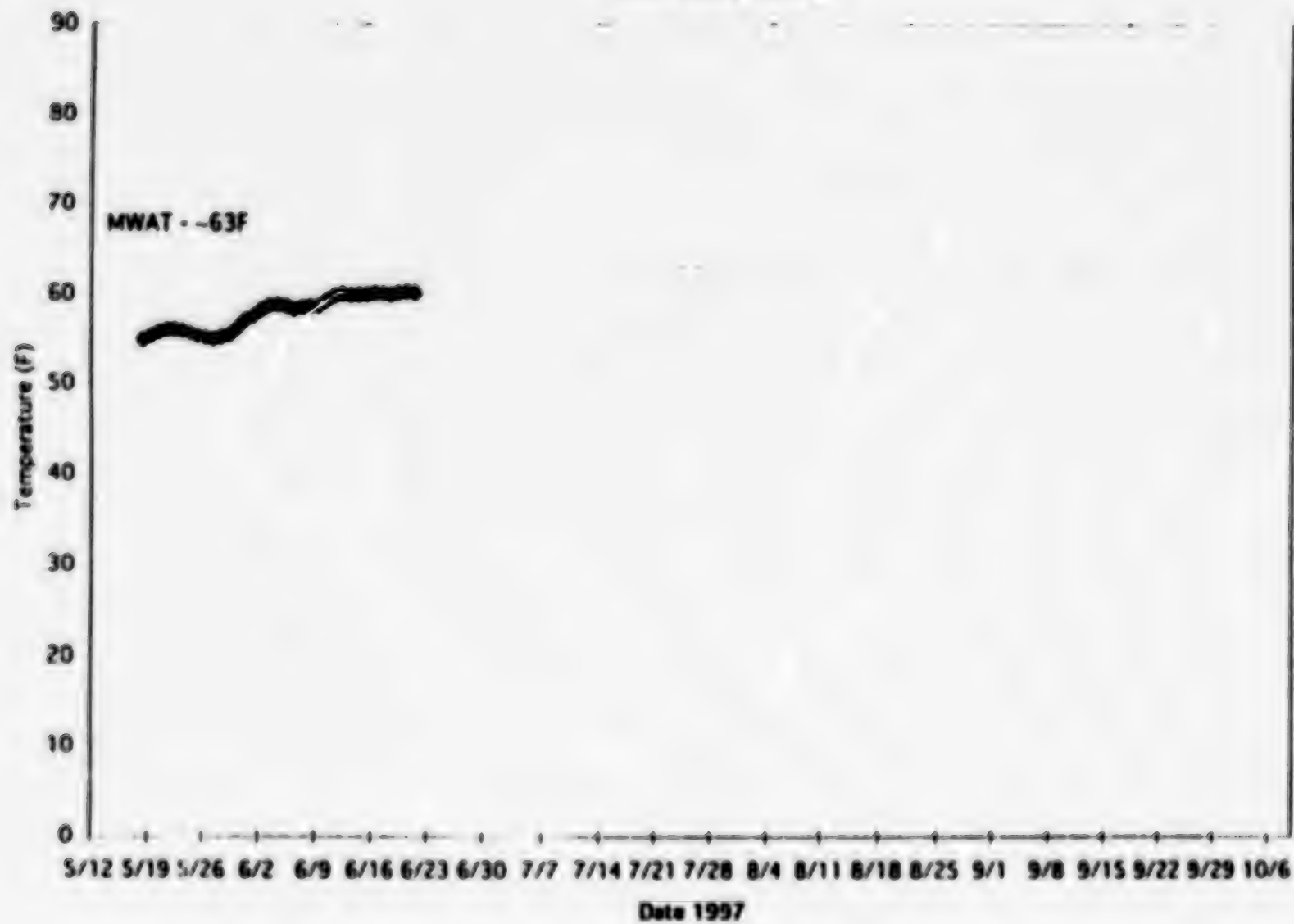


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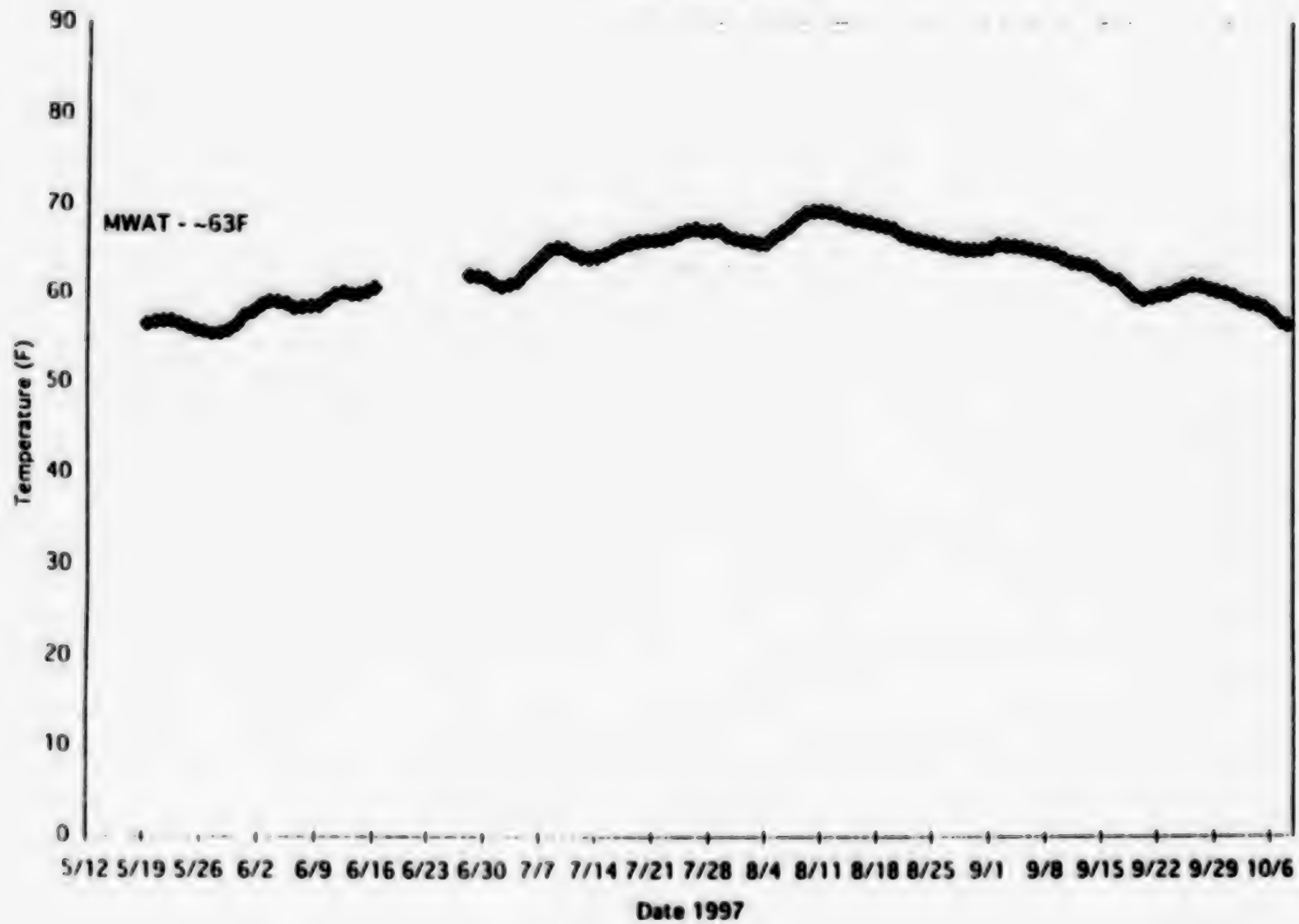
Etna Creek Above
Weekly Moving Average



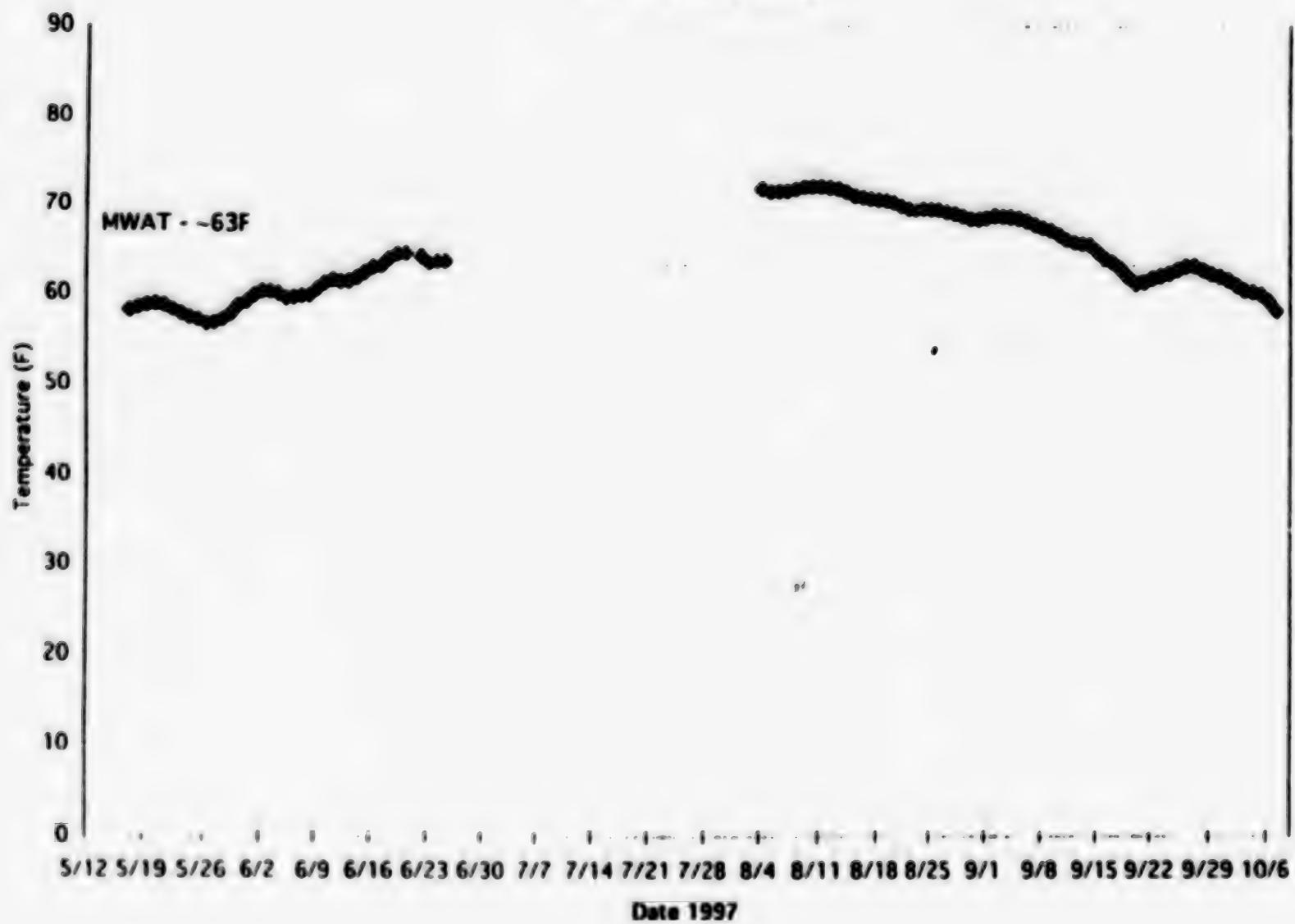
Etna Creek
Weekly Moving Average



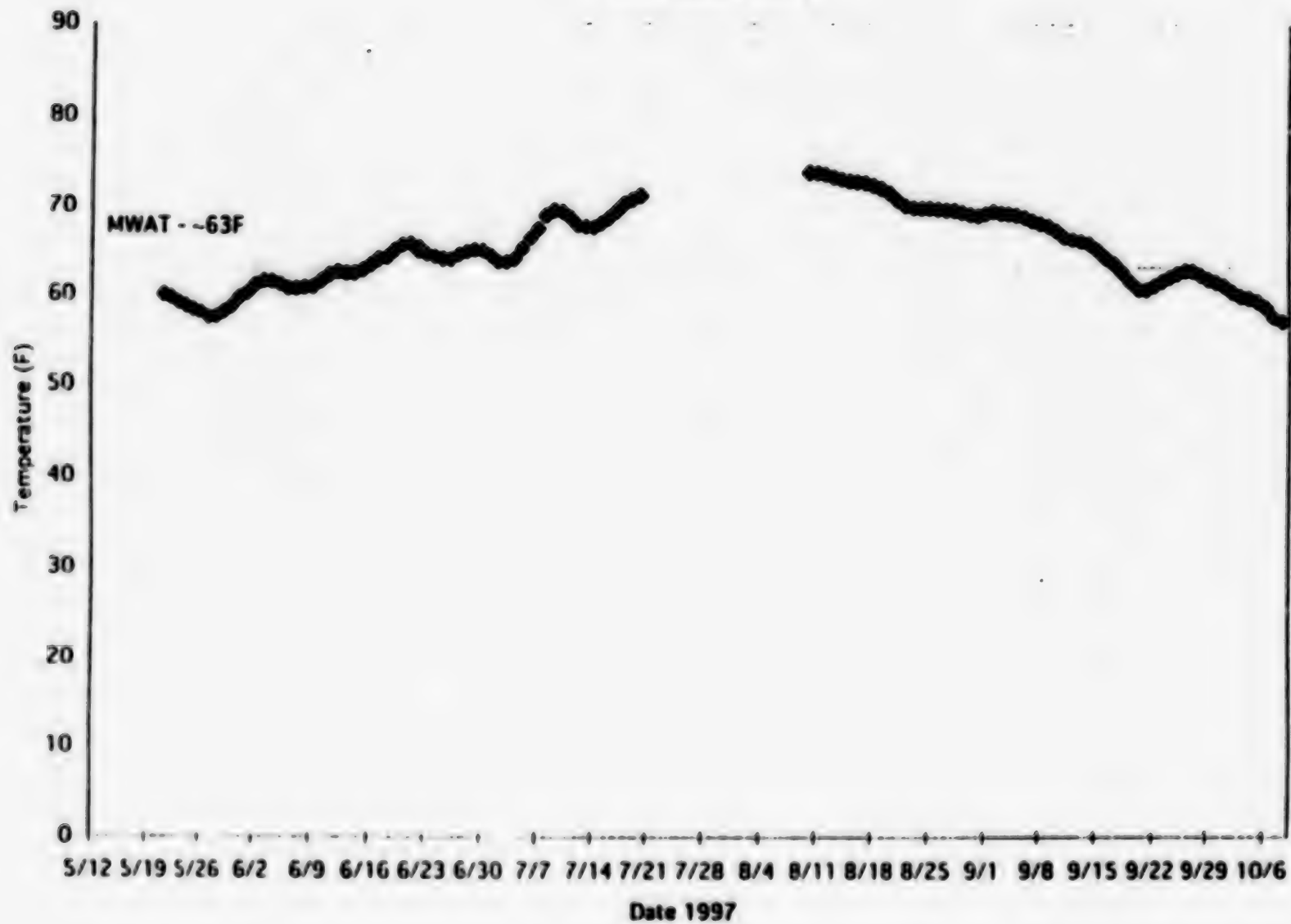
Etna Below
Weekly Moving Average



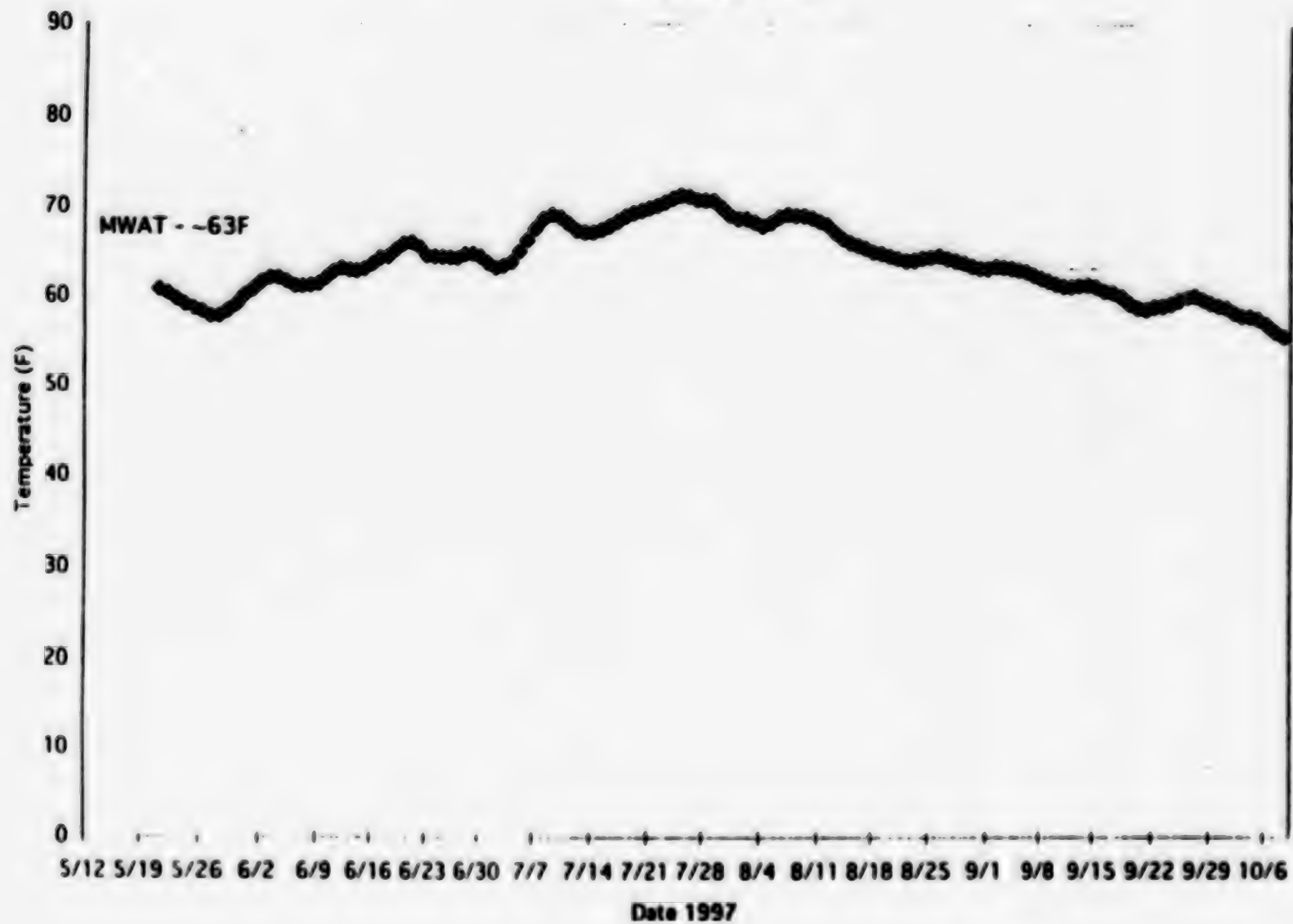
Eller Lane
Weekly Moving Average



Serpa Lane
Weekly Moving Average



Eiler
Weekly Moving Average

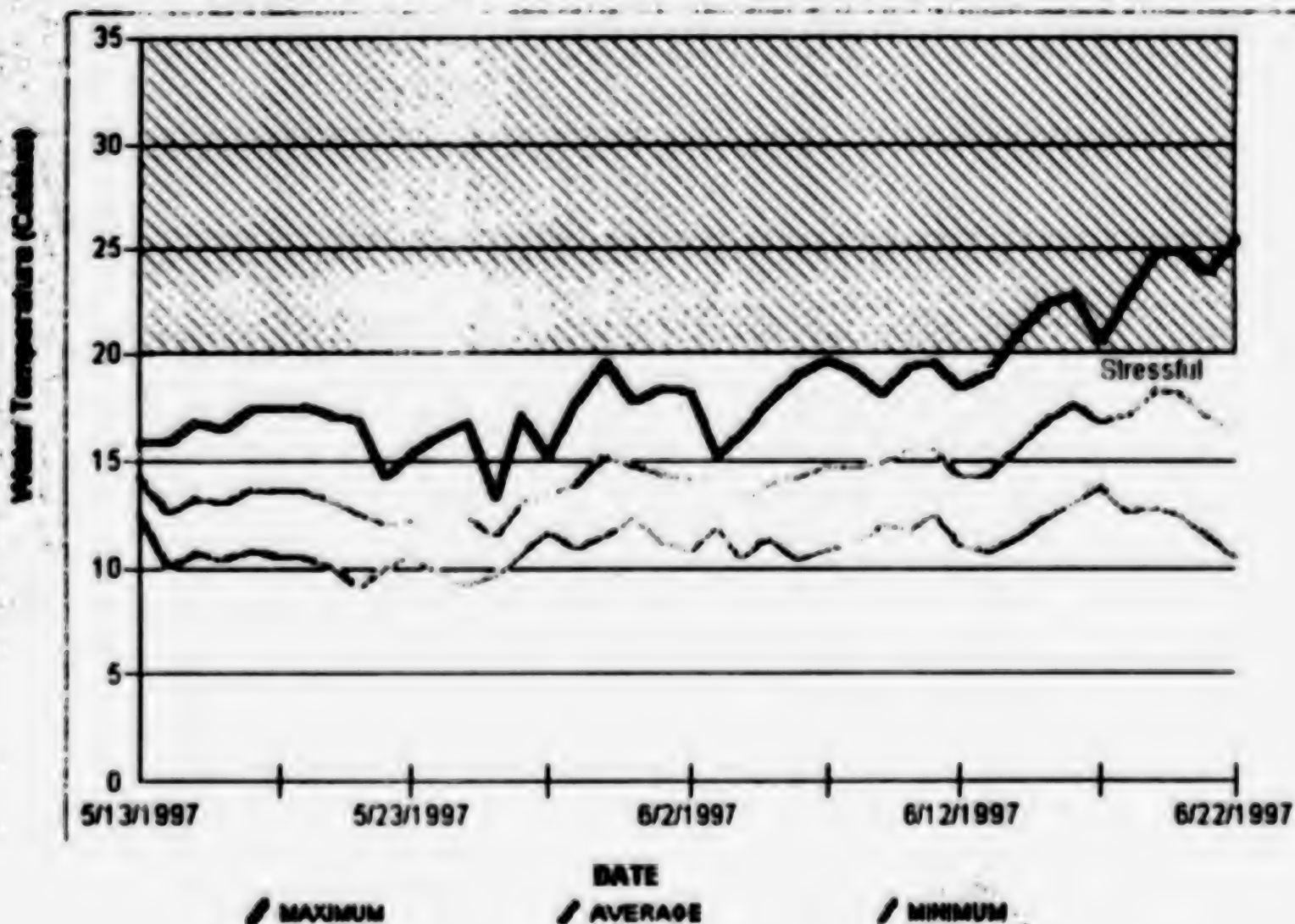


APPENDIX F - KRIS Treatments

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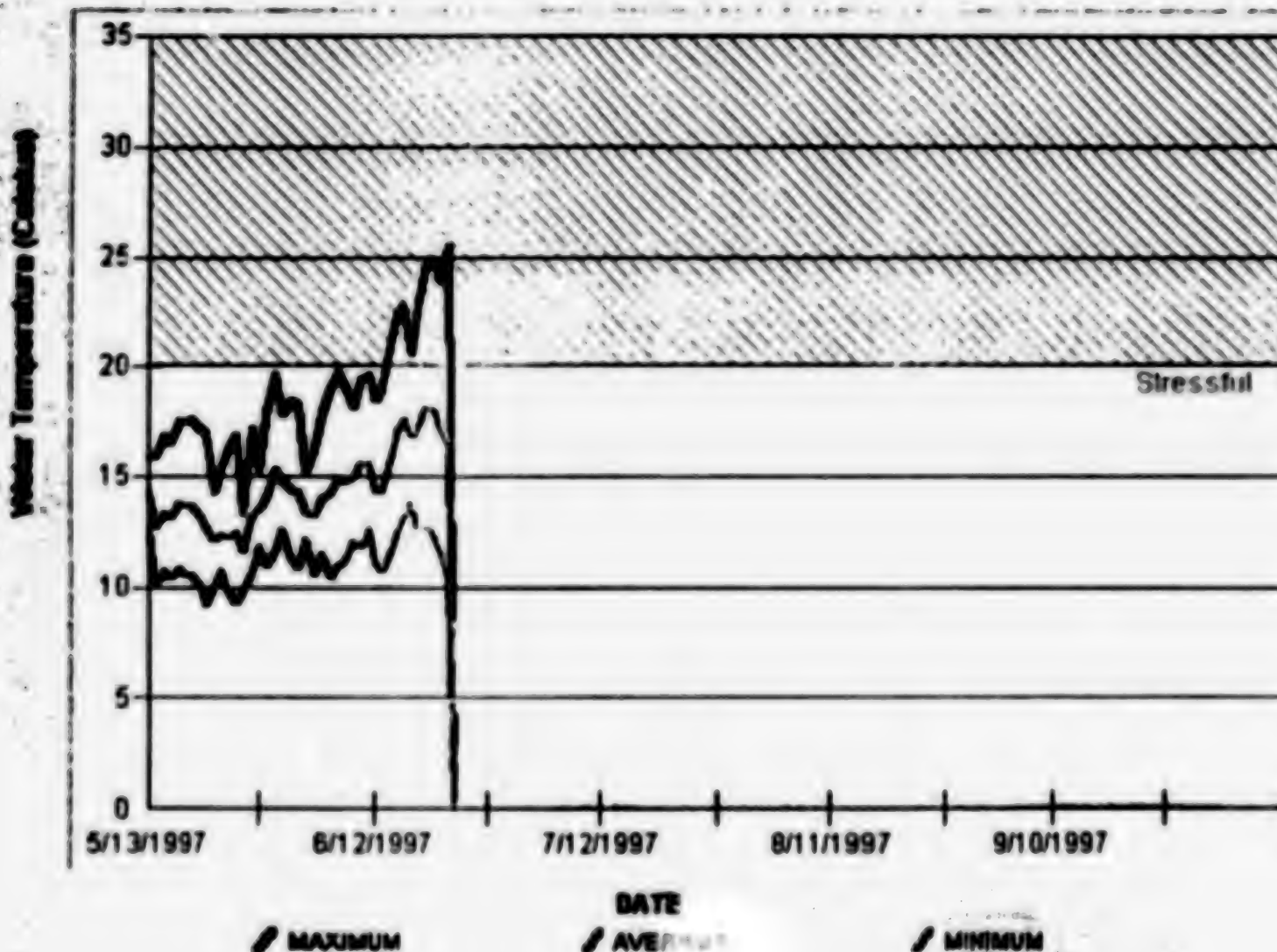
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Daily Max/Ave/Min Water Temperatures: Scott River, Alexander's 1997



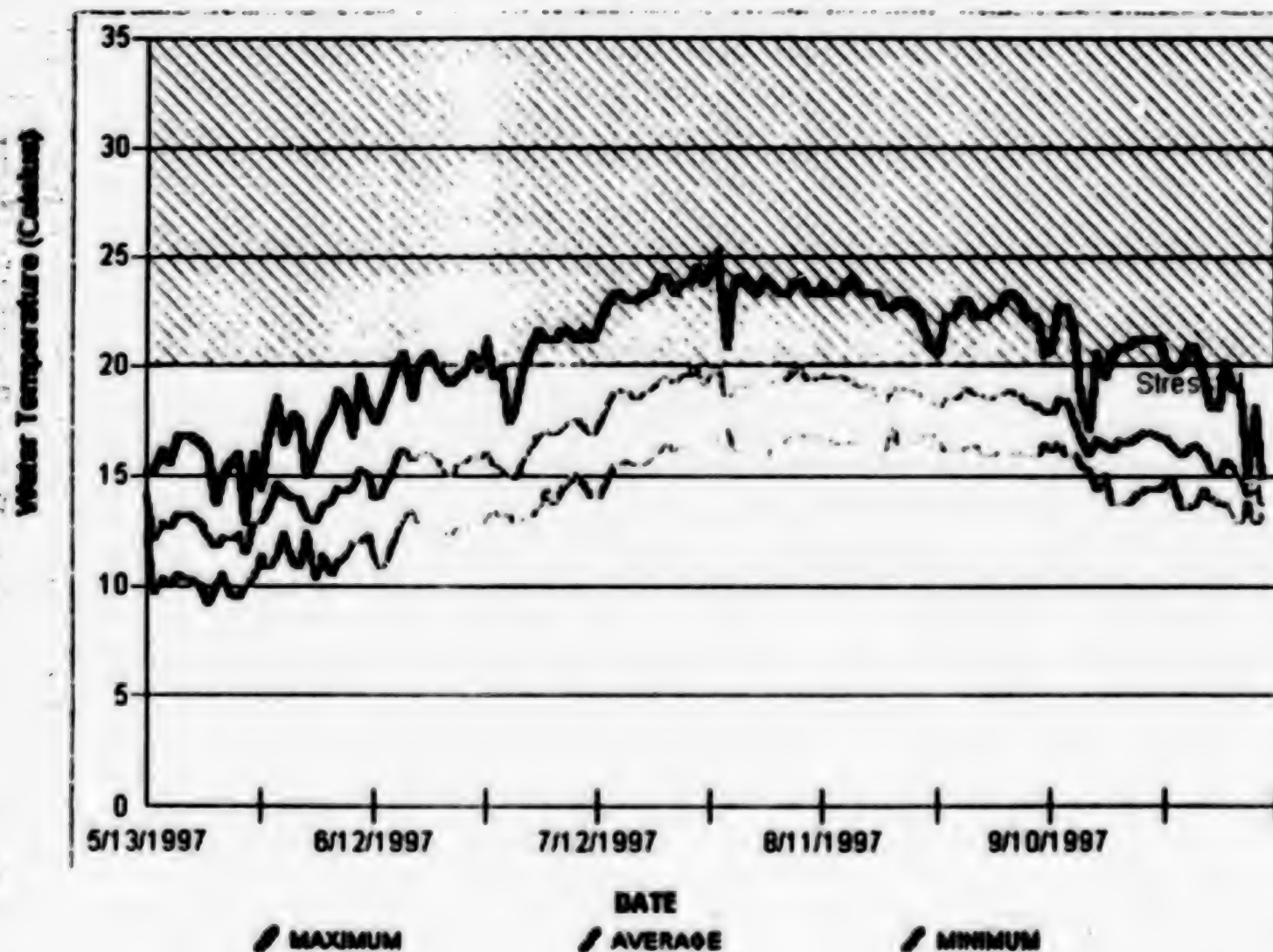
This chart shows the daily maximum, average and minimum water temperatures in the Scott River at the Alexander property (River Mile 55.3) from mid May to late June 1997. No data exists beyond June 22, 1997 because the river was dry. The maximum temperature exceeded stressful levels for salmonids beginning in mid June. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: Scott River, Alexander's 1997



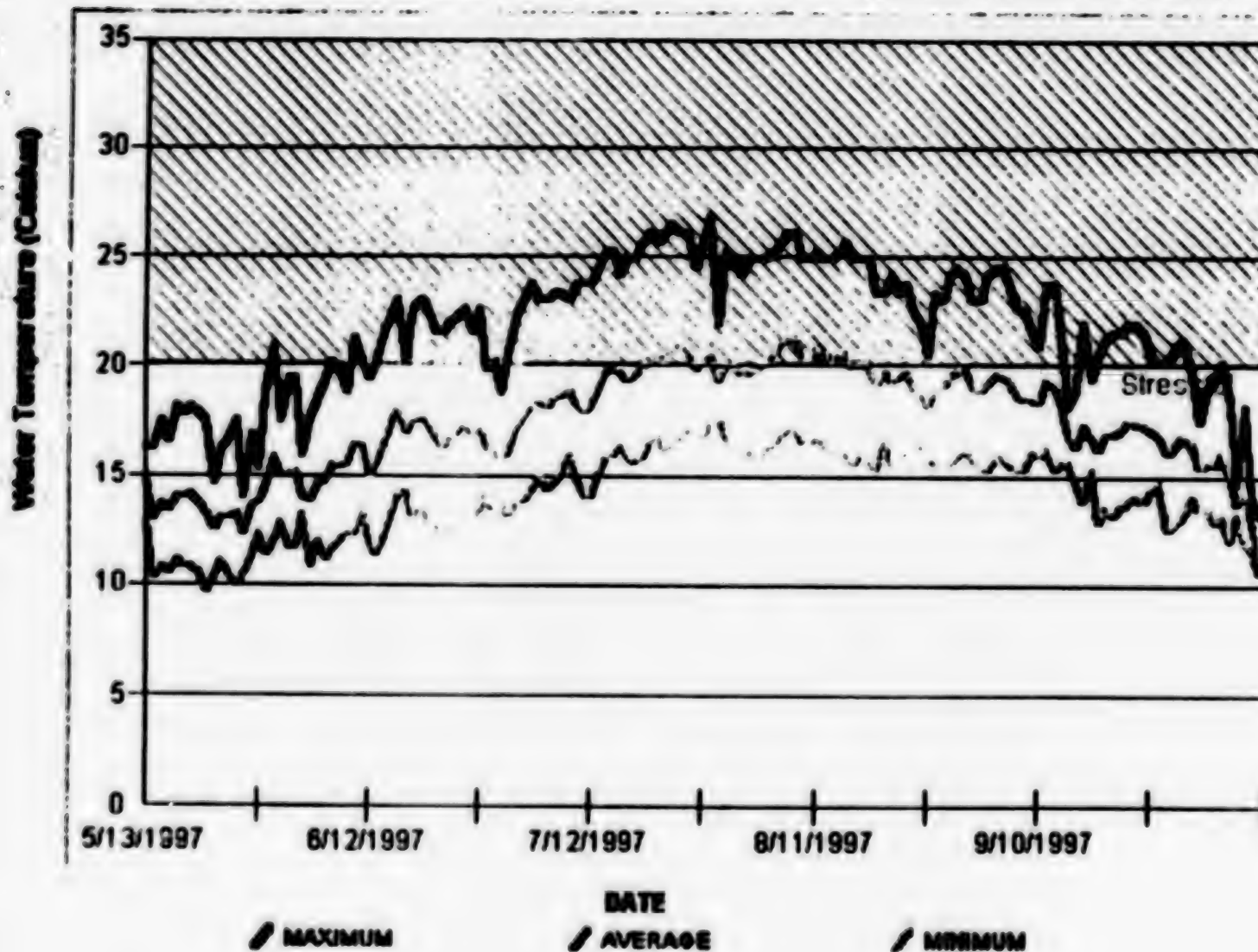
This chart shows the daily maximum, average and minimum water temperatures in the Scott River at the Alexander property (River Mile 55.3) from mid May to late June 1997. No data exists beyond June 22, 1997 because the river was dry. The maximum temperature exceeded stressful levels for salmonids beginning in mid June. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Maxi/Ave/Min Water Temperatures: Scott River, Fay Lane 1997



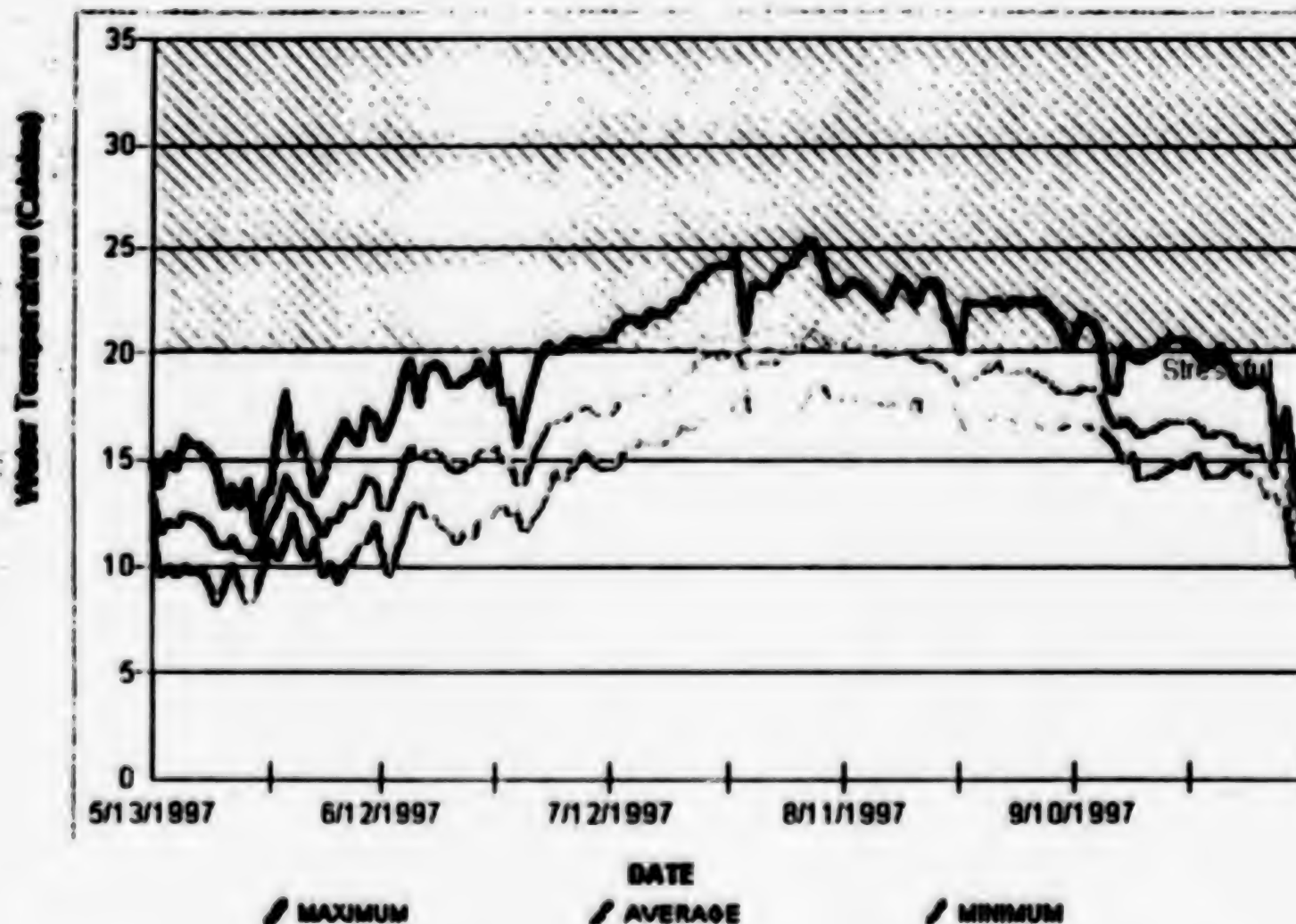
This chart shows the daily maximum, average and minimum water temperatures in the Scott River at Fay Lane (River Mile 52.6) from mid May to early October 1997. The maximum temperature exceeded stressful levels for salmonids from mid June through early September, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: Scott River, above French Creek 1997



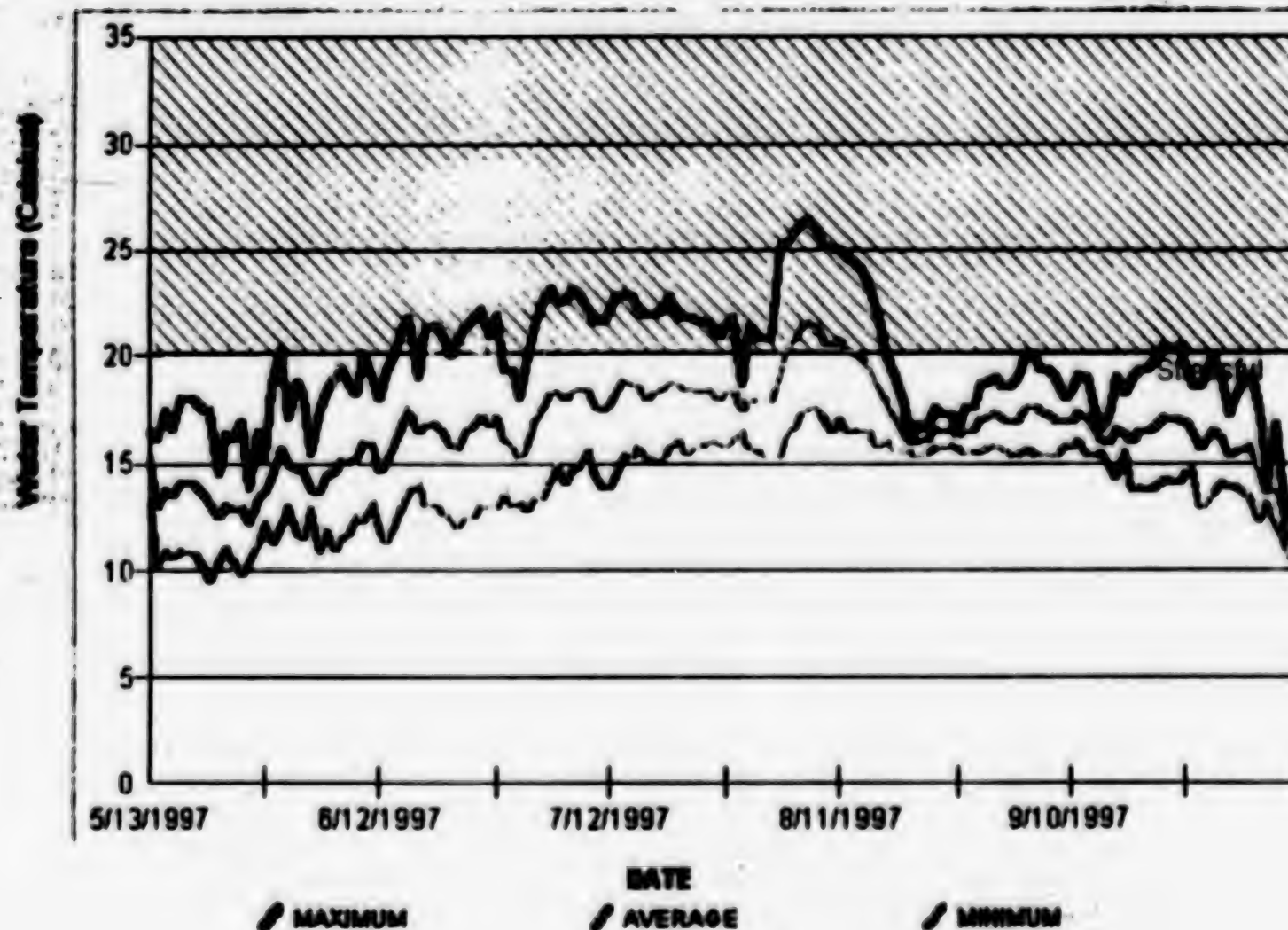
This chart shows the daily maximum, average and minimum water temperatures in the Scott River above French Creek (River Mile 50.9) from mid May to early October 1997. The maximum temperature exceeded stressful levels for salmonids from mid June through mid September, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: French Creek near the Mouth 1997



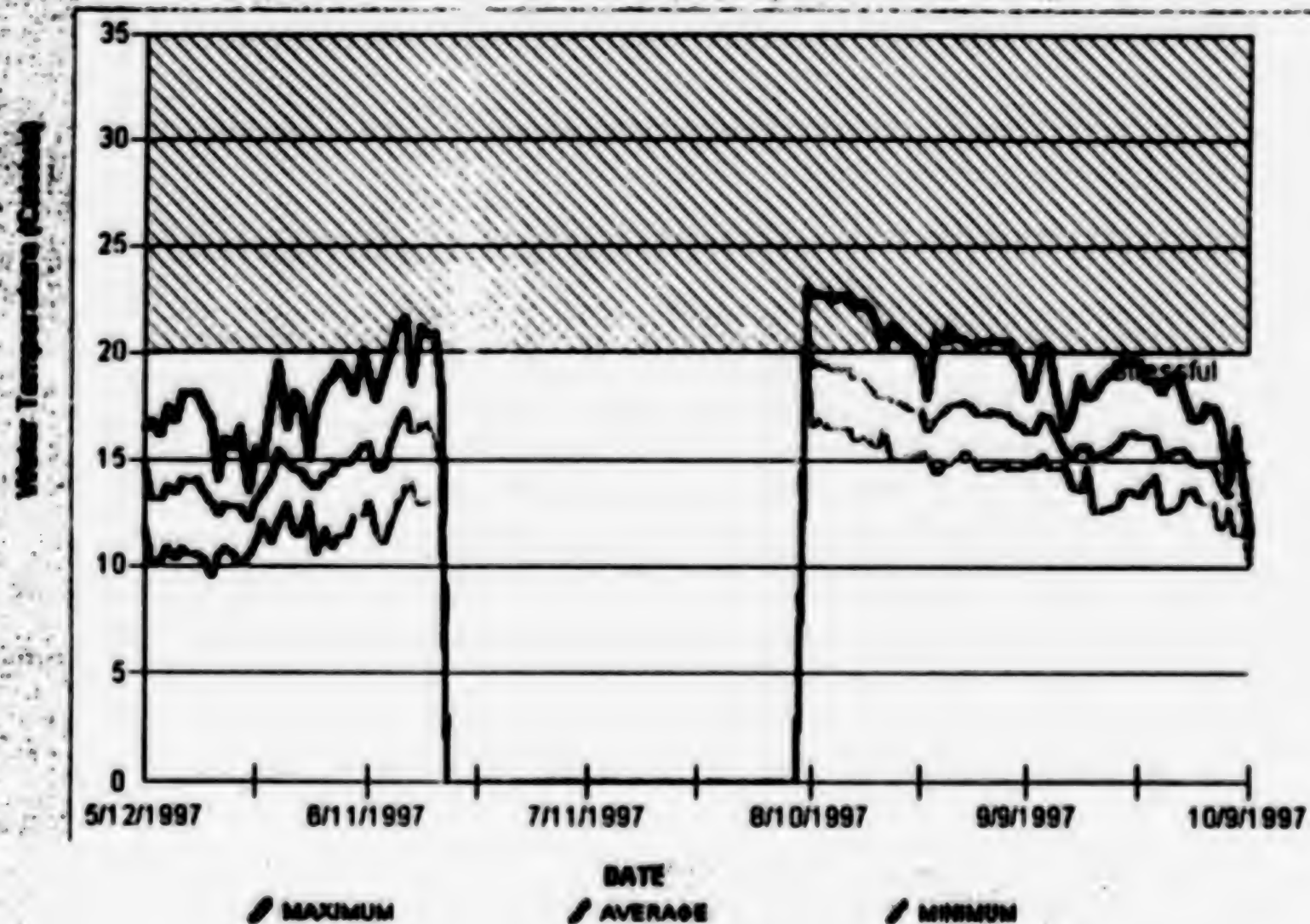
This chart shows the daily maximum, average and minimum water temperatures in French Creek just above the confluence with the Scott River from mid May through early October, 1997. The maximum temperature exceeded stressful levels for salmonids from early July through early September, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

**Daily Max/Ave/Min Water Temperatures: Scott River, below French Creek
1997**



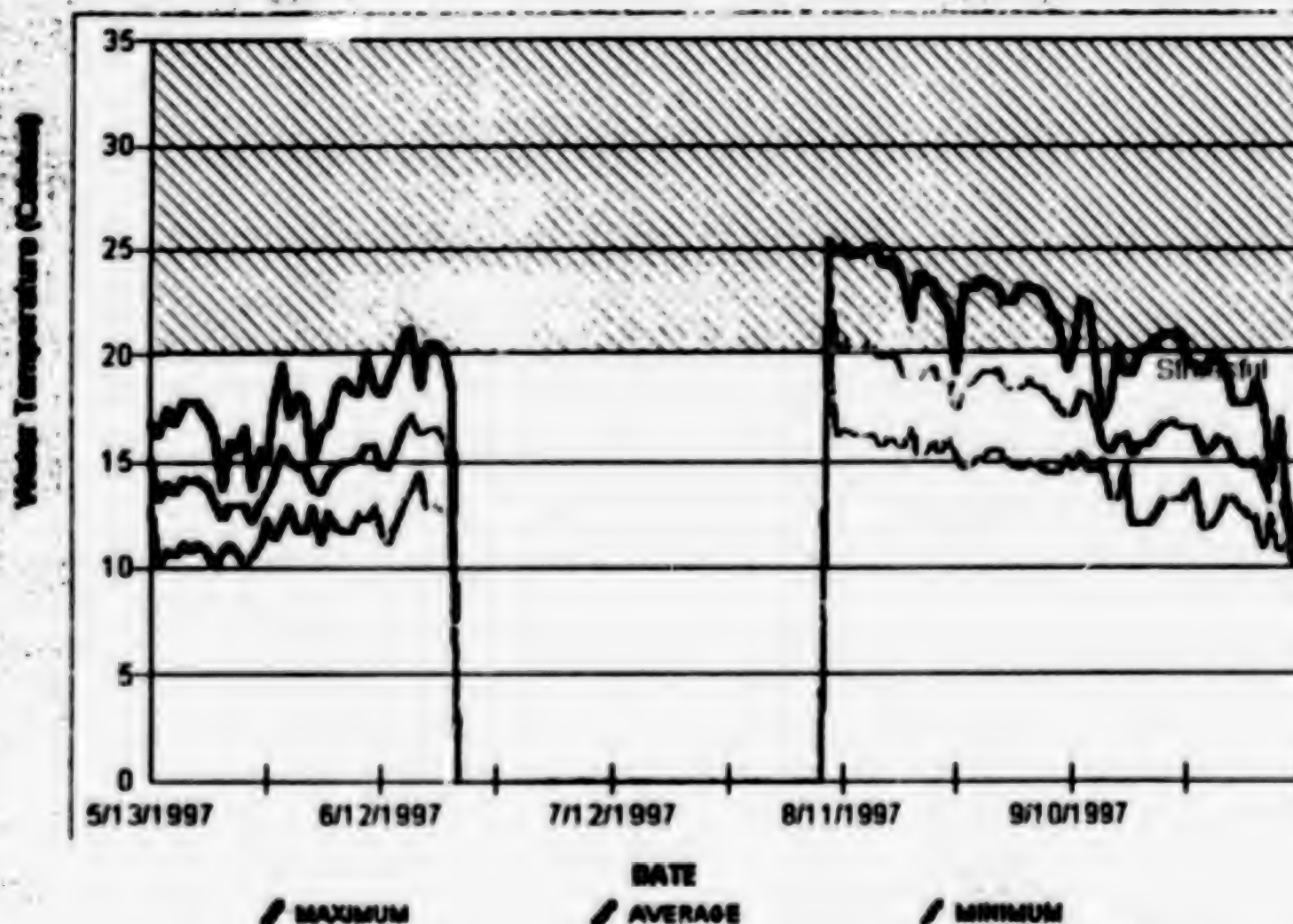
This chart shows the daily maximum, average and minimum water temperatures in the Scott River below French Creek (River Mile 50.7) from mid May to early October 1997. The validity of the data is questionable from early August through the early part of September. The maximum temperature exceeded stressful levels for salmonids from mid June through mid August, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: Scott River, Horn Lane 1997



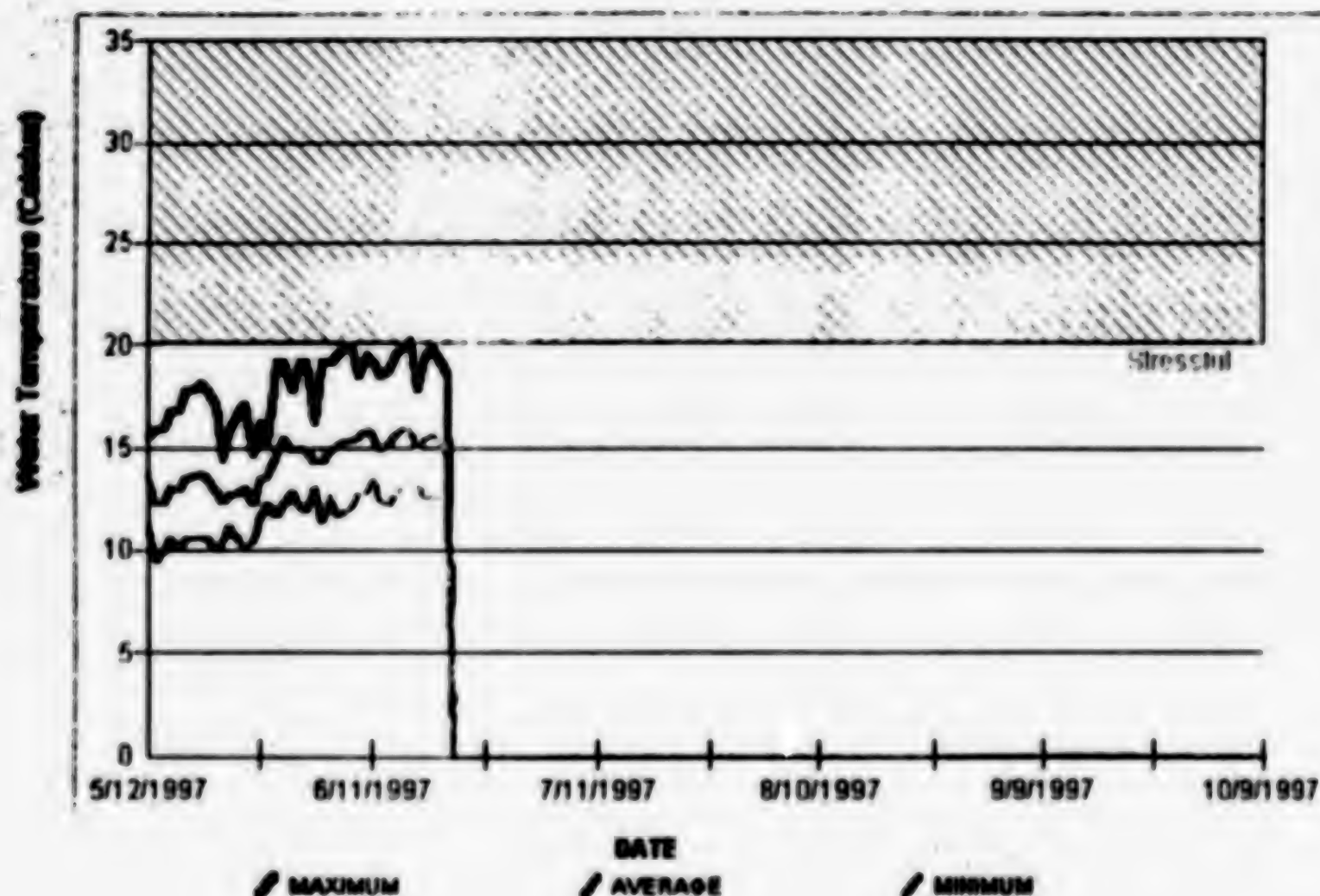
This chart shows the daily maximum, average and minimum water temperatures in the Scott River at Horn Lane (River Mile 46.9) from mid May to early October 1997. The data gap from June 21-August 9, 1997 is due to the HoboTemp not being found when data was scheduled to be retrieved on August 9, 1997. The maximum temperature exceeded stressful levels for salmonids from mid August through early September, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: Scott River, above Etna Creek 1997



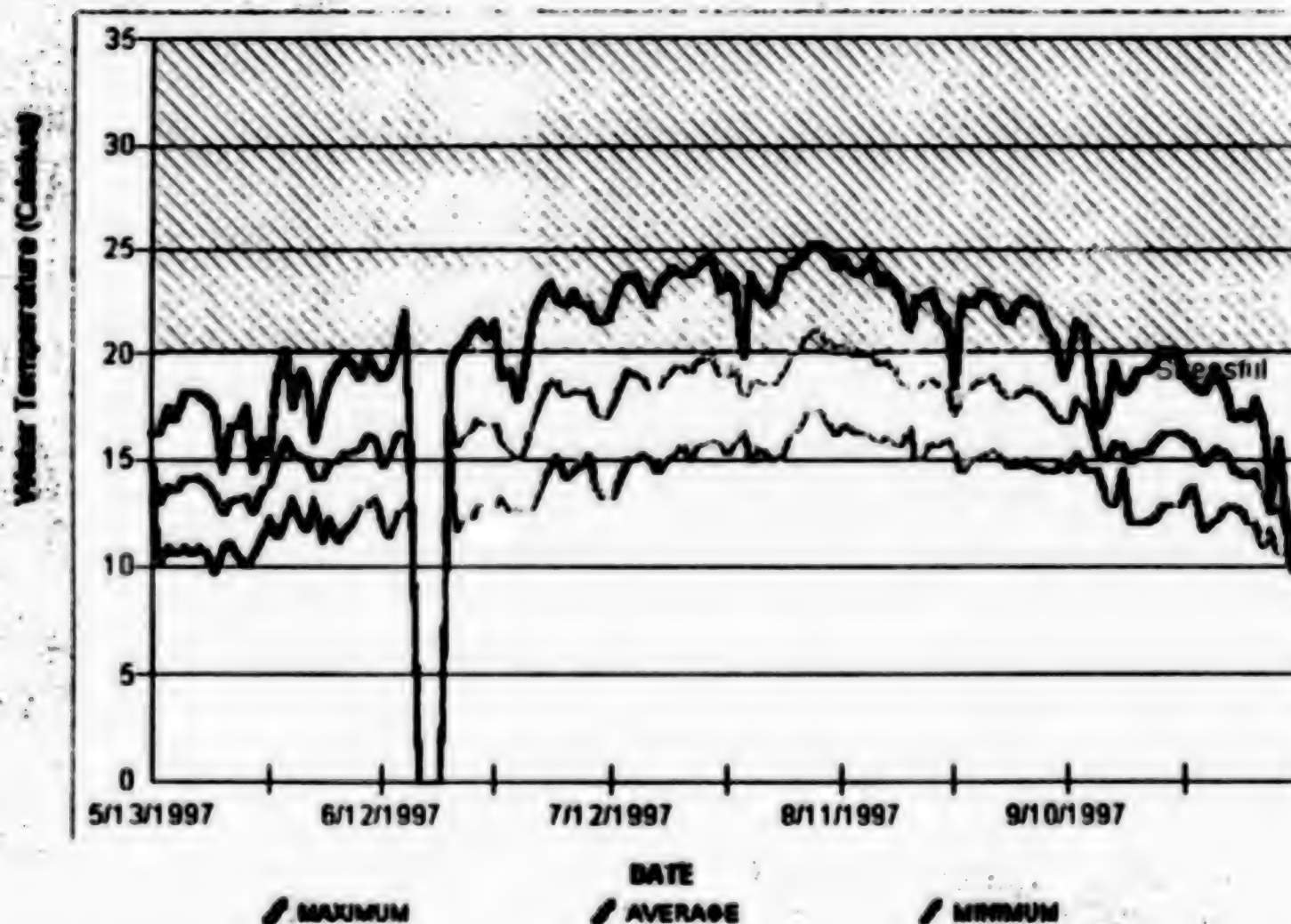
This chart shows the daily maximum, average and minimum water temperatures in the Scott River above Etna Creek (River Mile 45.2) from mid May to early October 1997. The data gap from June 21-August 9, 1997 is due to the HoboTemp not being found when data was scheduled to be retrieved on August 9, 1997. The maximum temperature exceeded stressful levels for salmonids from mid August through early September, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: Etna Creek near the Mouth 1997



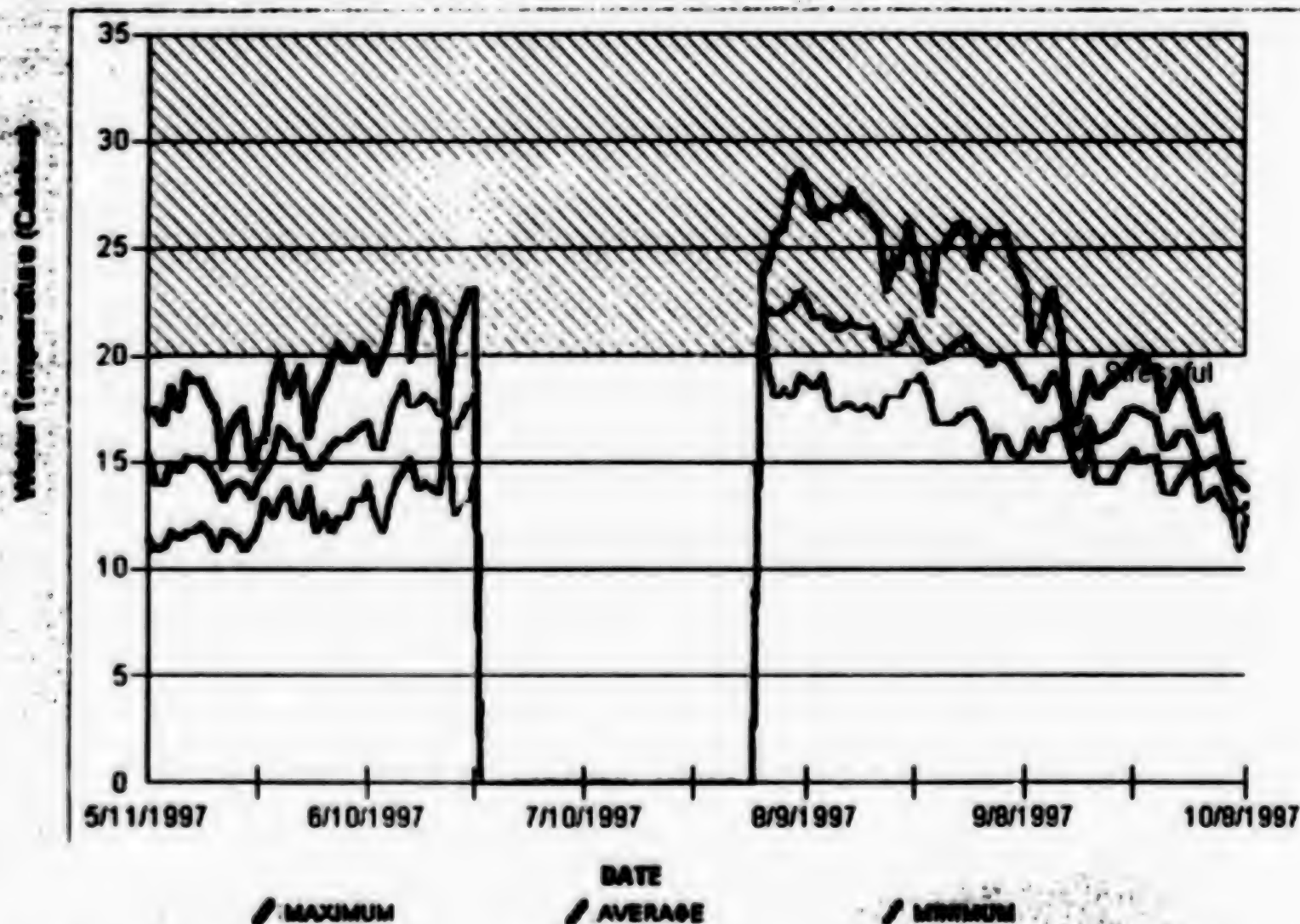
This chart shows the daily maximum, average and minimum water temperatures in Etna Creek just above the confluence with the Scott River from mid May to late June 1997. The Hobo Temp was found missing when data was scheduled to be retrieved on August 3, 1997. The maximum temperature did not exceed stressful levels for salmonids through mid June. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: Scott River, below Etna Creek 1997



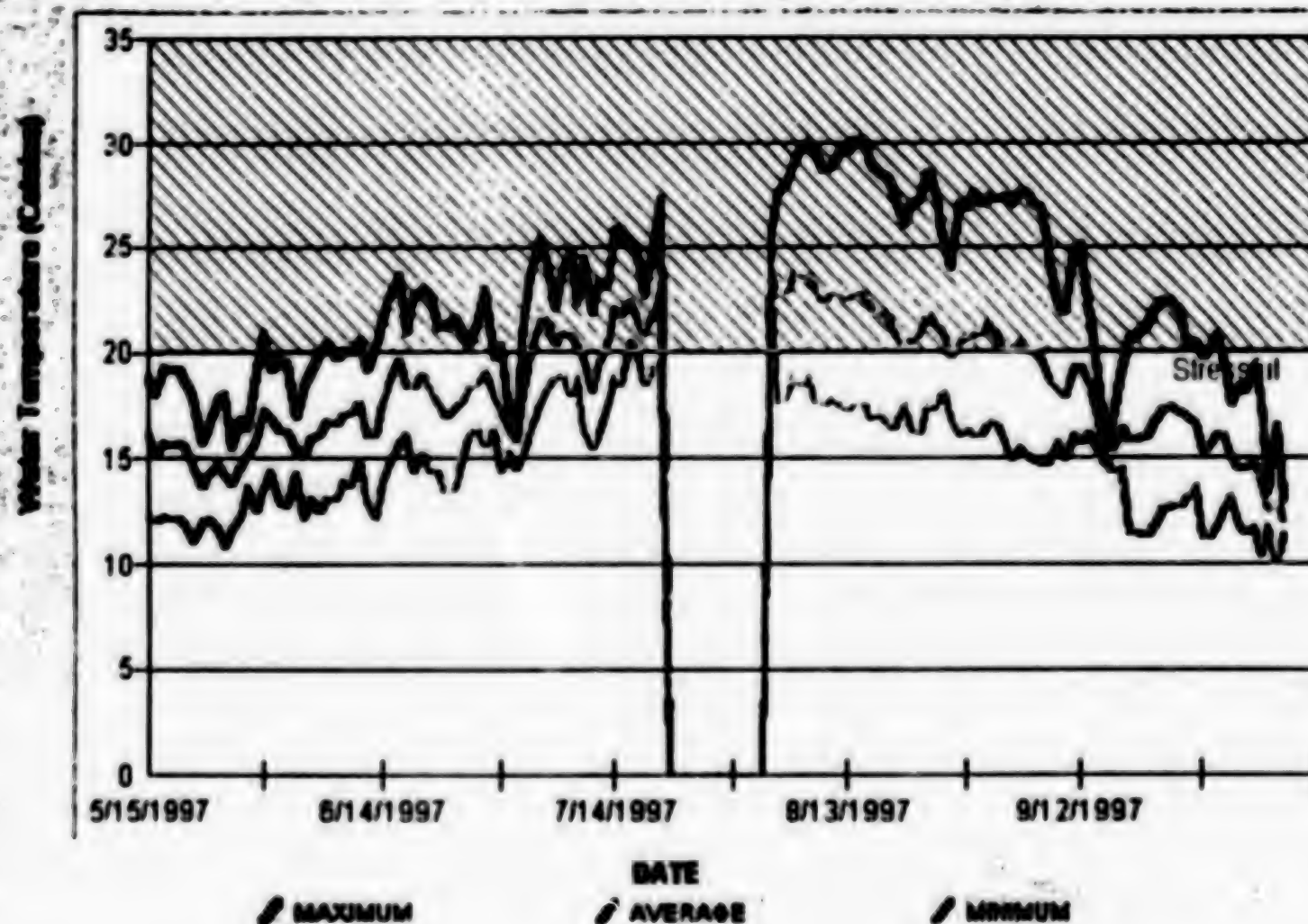
This chart shows the daily maximum, average and minimum water temperatures in the Scott River below Etna Cr. (River Mile 45.0) from mid May to early October 1997. The data gap from June 16-June 21, 1997 is due to the HoboTemp being found out of the water, giving erroneous temperature readings. The maximum temperature exceeded stressful levels for salmonids from mid June through early September, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: Scott River, Eller Lane 1997



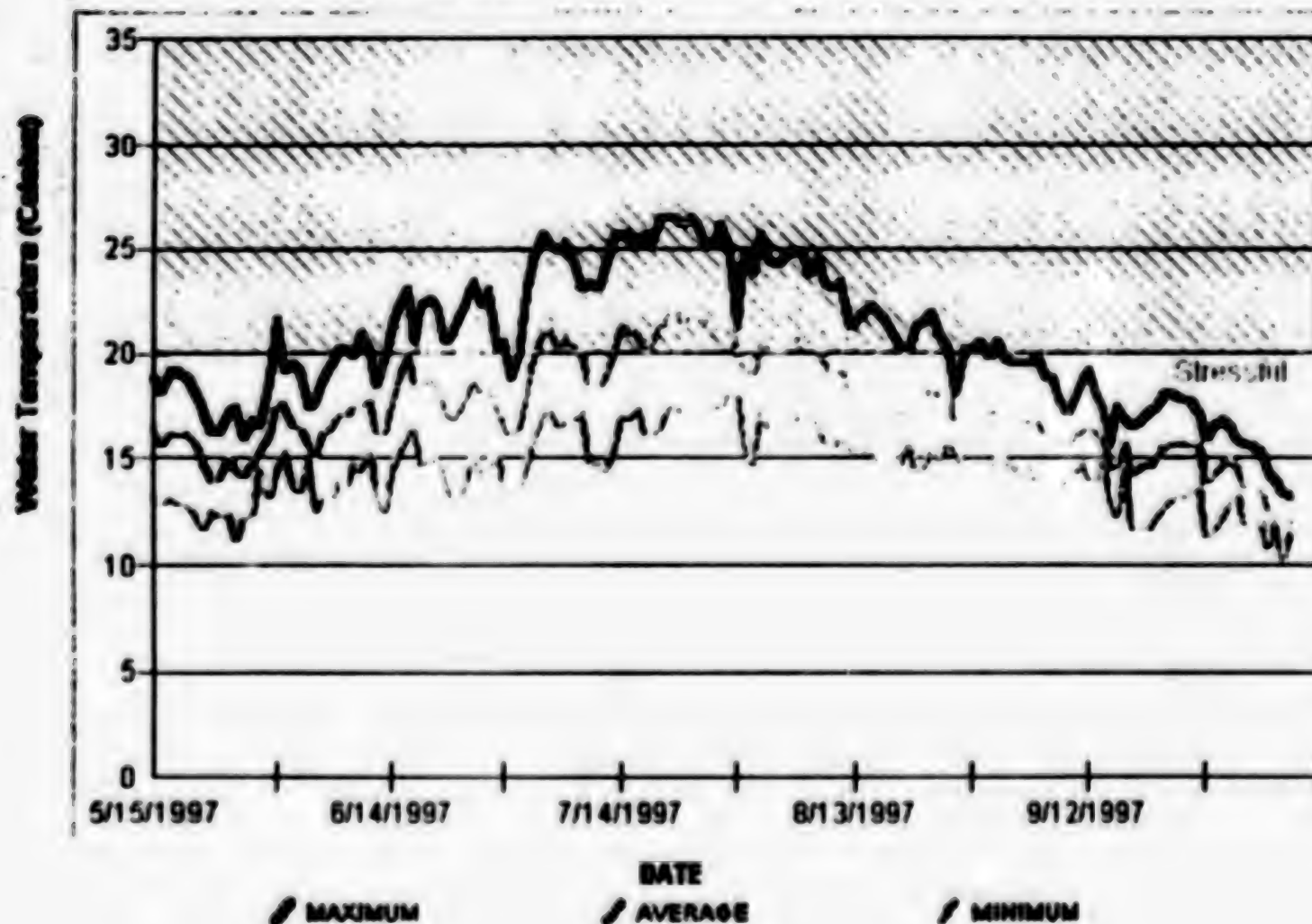
This chart shows the daily maximum, average and minimum water temperatures in the Scott River at Eller Lane (River Mile 40.7) from mid May to early October 1997. The data gap from June 26-August 3 is due to the HoboTemp being buried in the sand, giving erroneous temperature readings. The maximum temperature exceeded stressful levels for salmonids from mid June through August, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: Scott River, Serpa Lane 1997



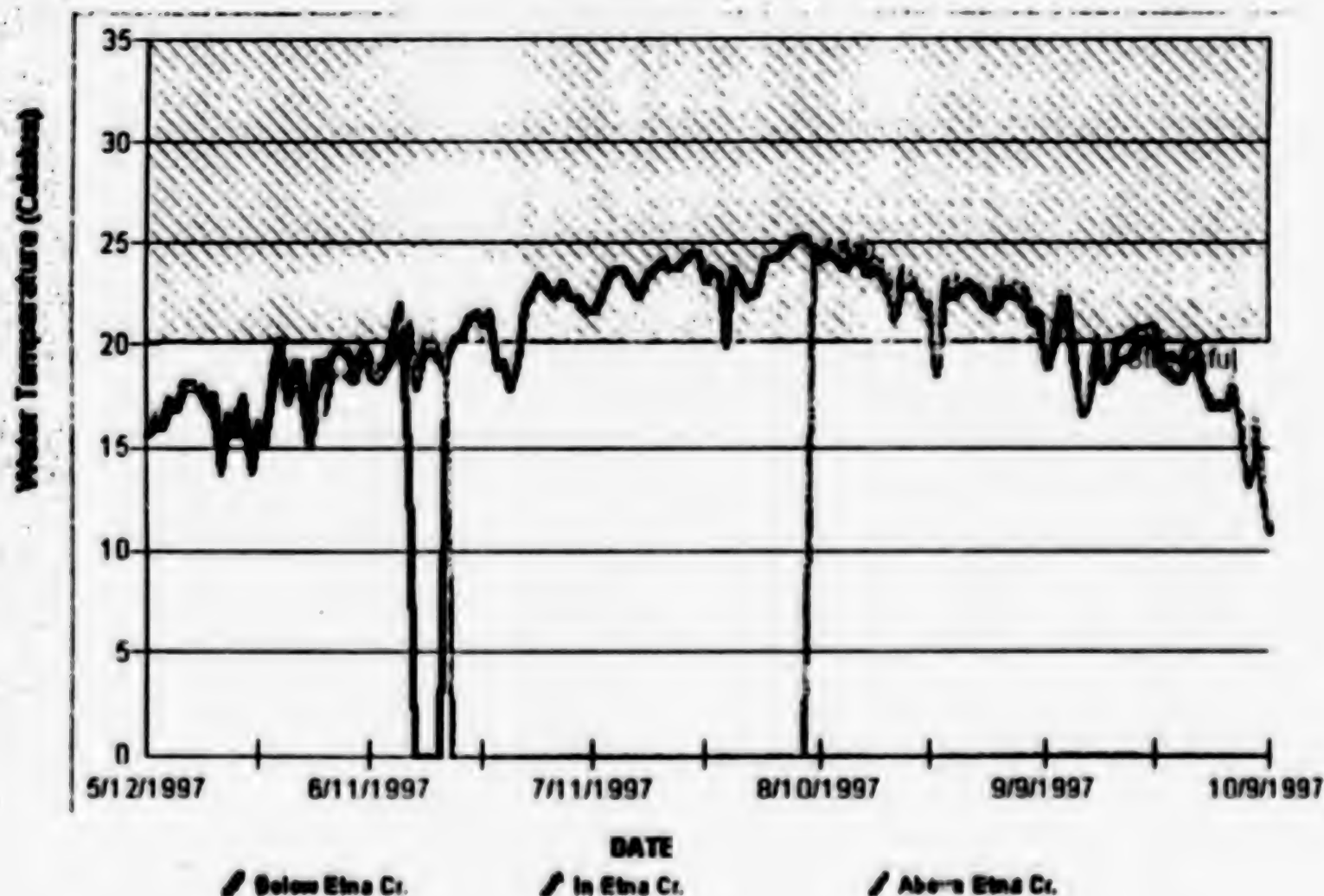
This chart shows the daily maximum, average and minimum water temperatures in the Scott River at Serpa Lane (River Mile 36.8) from mid May to early October 1997. The data gap from July 21-August 3 is due to the HoboTemp being buried in the sand, giving erroneous temperature readings. The maximum temperature exceeded stressful levels for salmonids from mid June through August, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

Daily Max/Ave/Min Water Temperatures: Scott River, Eiler Ranch 1997



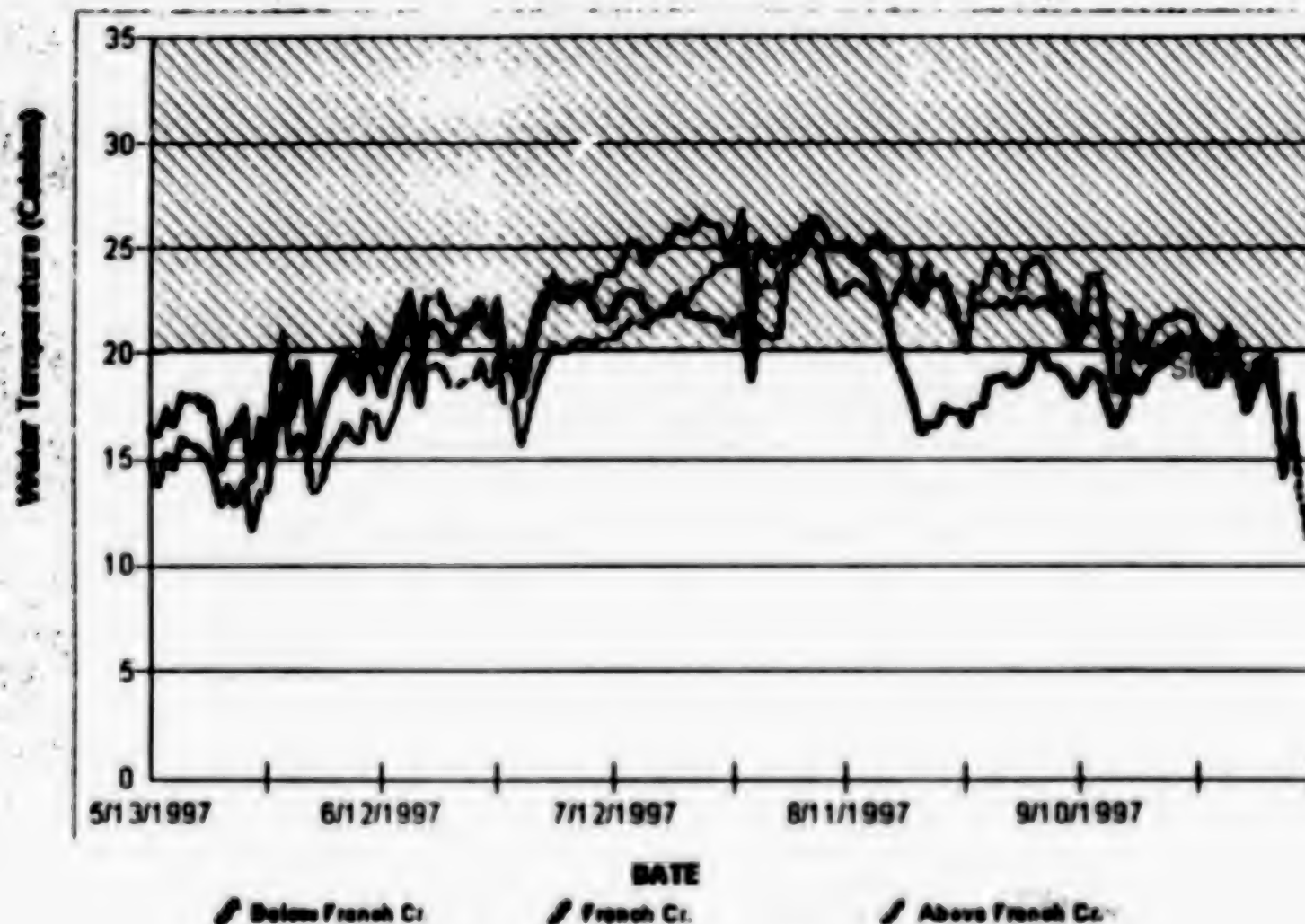
This chart shows the daily maximum, average and minimum water temperatures in the Scott River the Eiler Ranch (River Mile 29.9) from mid May to early October 1997. The maximum temperature exceeded stressful levels for salmonids from mid June through August, 1997. Data was collected using HoboTemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

1997 Daily Max. Water Temperatures: Scott River, Above, Below and In Etna Creek



This chart shows the daily maximum temperatures in the Scott River, above, below and in Etna Creek from mid May to early October 1997. The influence of Etna Creek on the mainstem Scott River temperature is difficult to determine by this chart, especially due to data gaps in mid summer. Data gaps are due to erroneous data and from units found missing. These are reflected by showing a zero value. Data was collected using Hobotemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

1997 Daily Max. Water Temperatures: Scott River, Above, Below and In French Cr.



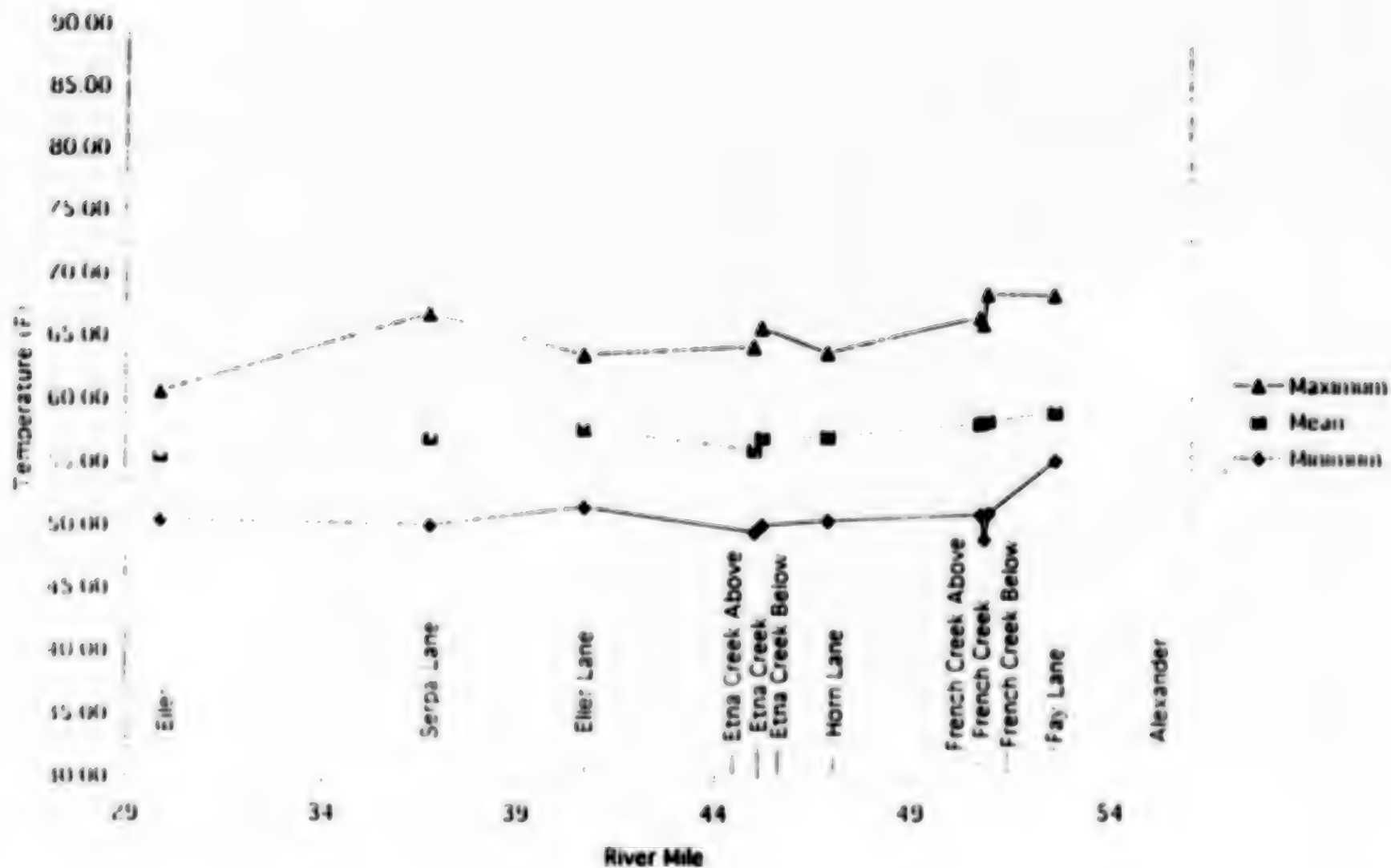
This chart shows the daily maximum temperatures in the Scott River, above, below and in French Creek from mid May to early October 1997. The influence of French Creek on the mainstem Scott River temperature is difficult to determine by this chart, due to possible erroneous data from below French Creek from mid July to early September. Data was collected using Hobotemp data recorders by Lorrie Bundy, Siskiyou Resource Conservation District.

APPENDIX G - Monthly Temperatures by River Mile

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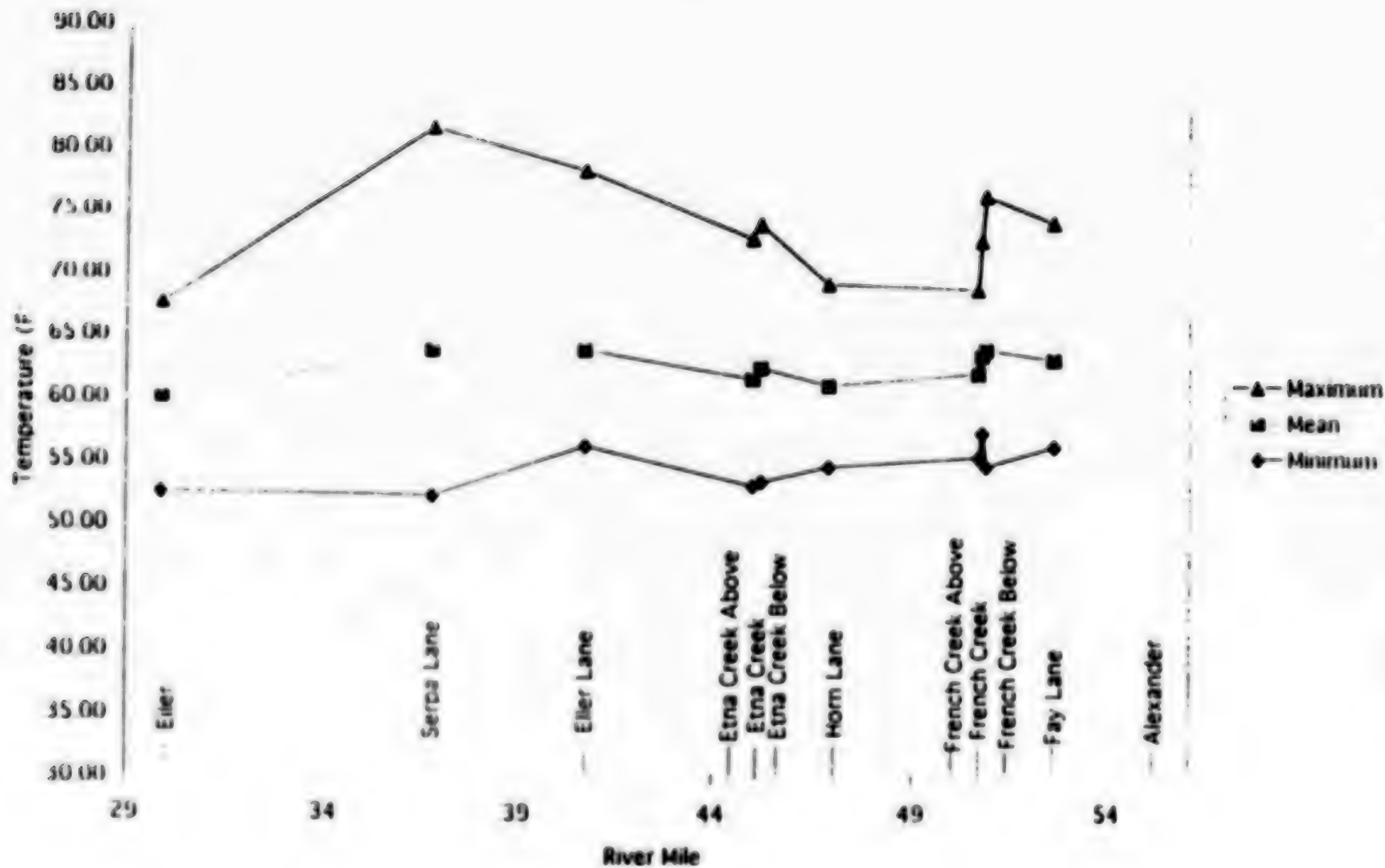
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October 1997



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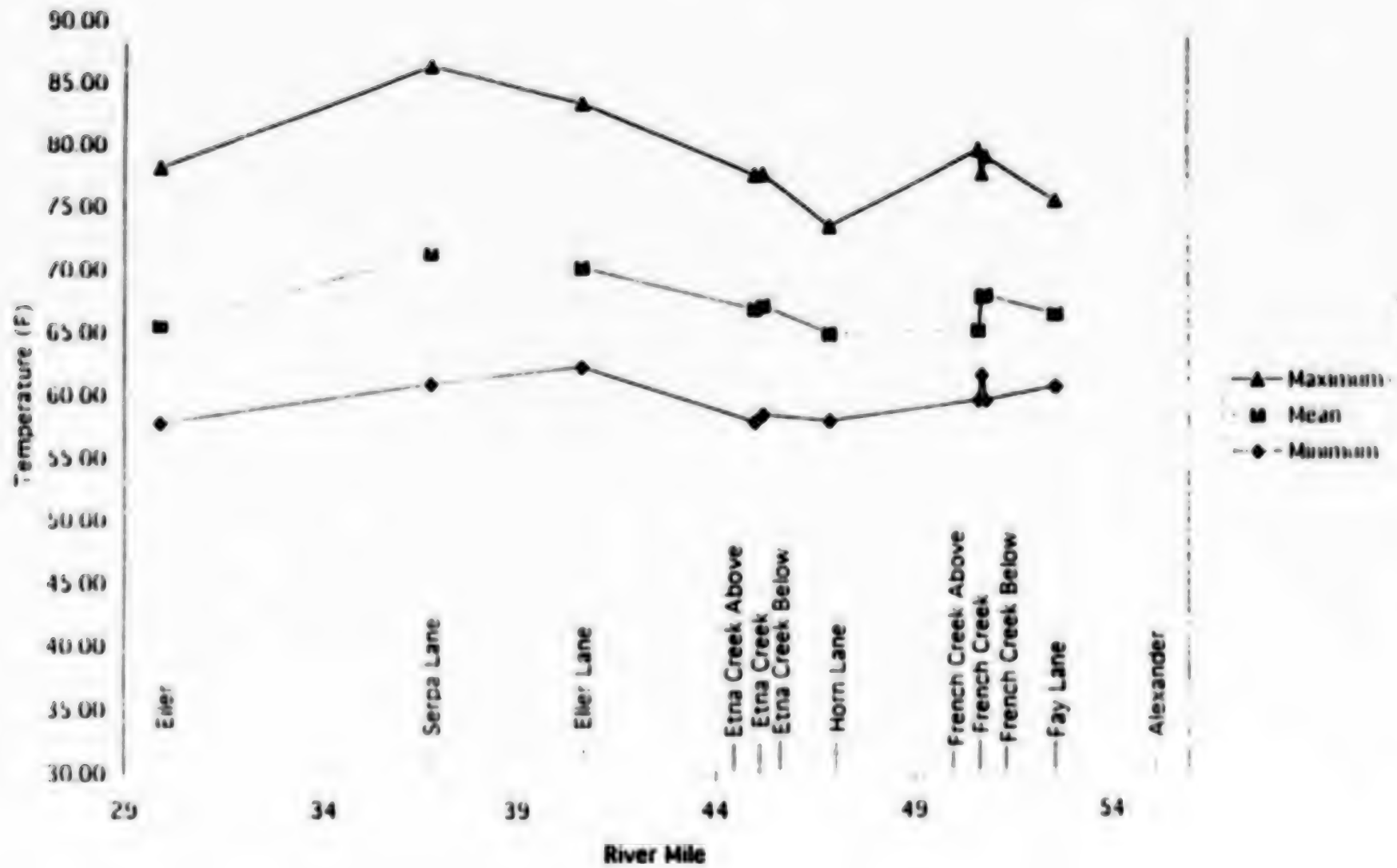
September 1997



53

53

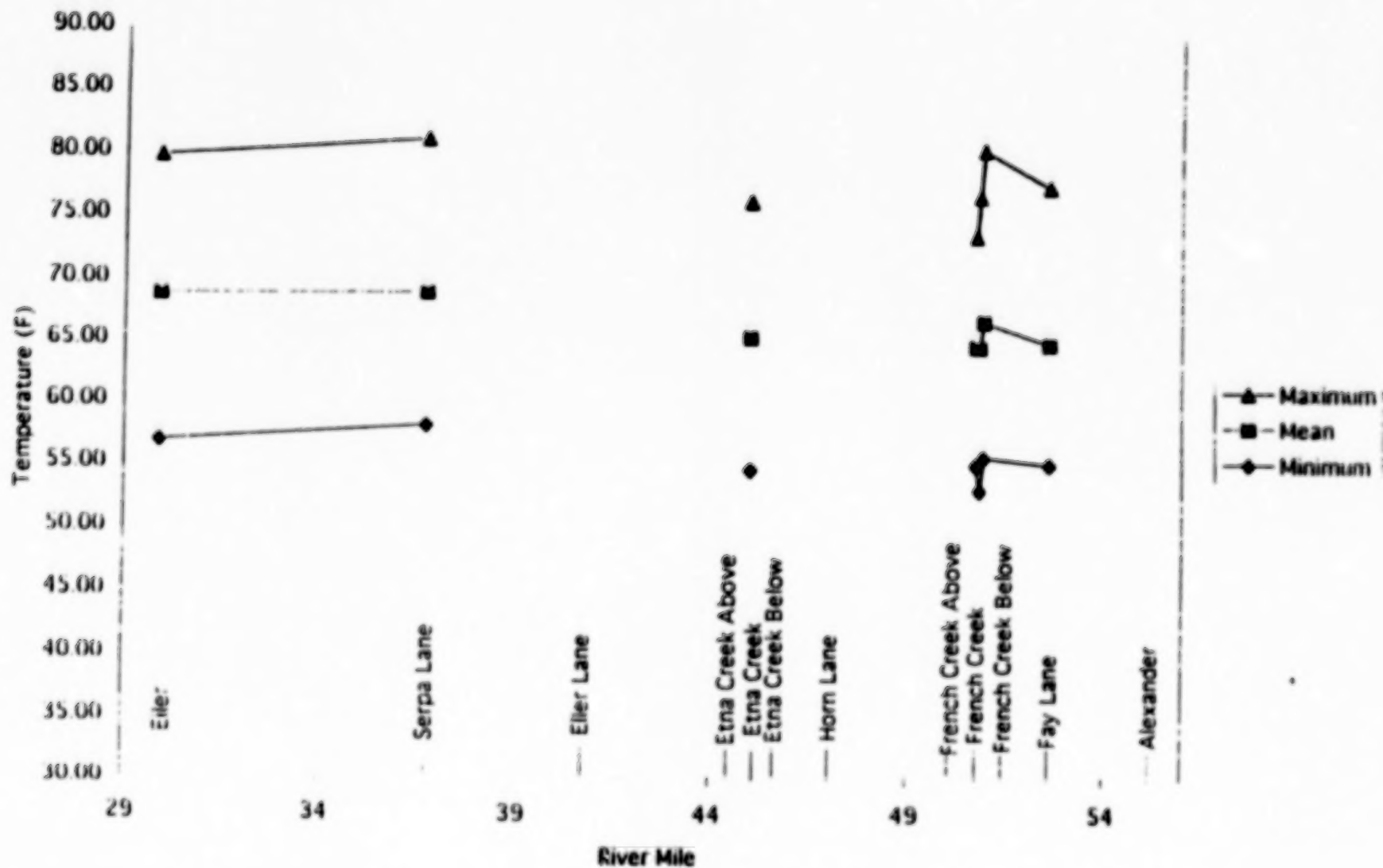
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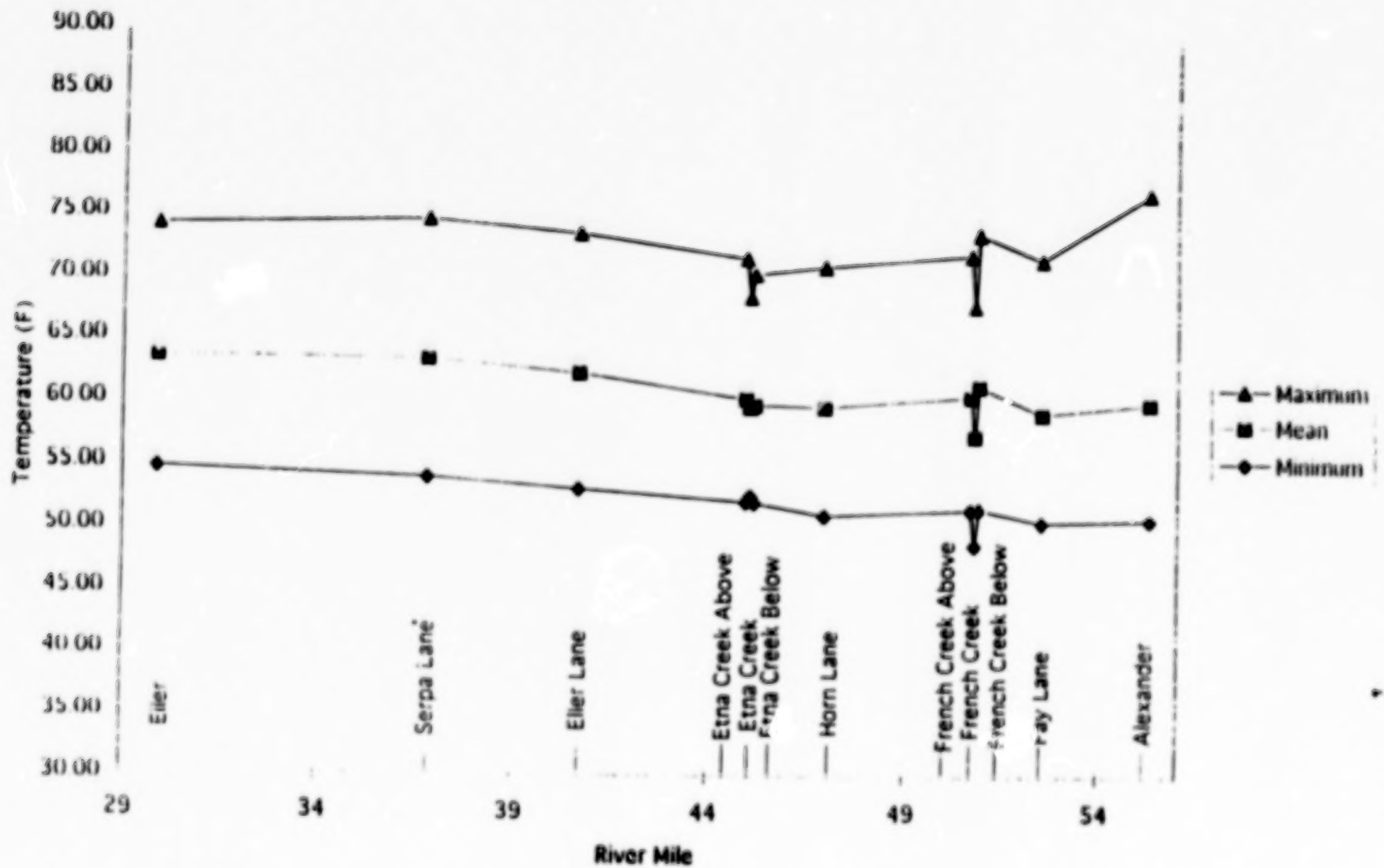
54

57

July 1997

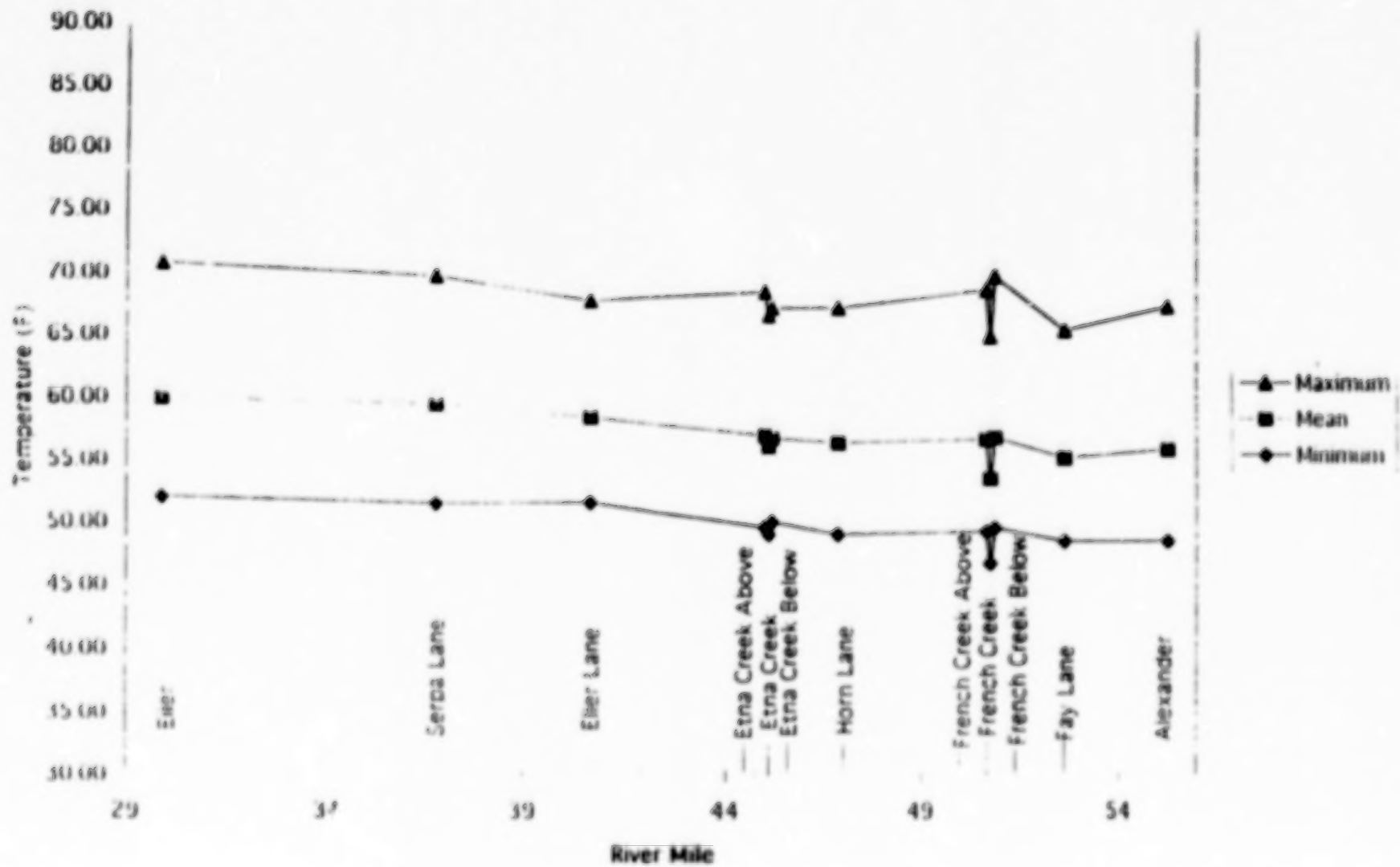


June 1997



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May 1997



57

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